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DEVOTED TO

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AND THE

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Devoted to Agriculture, Horticulture, and the Household Arts.

Agriculture is the nursing mother of the Arts. —*Xenophon.* | Tillage and Pasturage are the two breasts of the State.—*Sully.*

FRANK. G. RUFFIN, Editor. F. G. RUFFIN & N. AUGUST, Prop'rs.

VOL. XVIII. RICHMOND, VA., JANUARY, 1858. NO. 1.

Objections to Col. Cocke's Proposed Donation to the University of Va.

That portion of our readers interested in the proceedings of the Farmers' Assembly at the late Fair of the Virginia State Agricultural Society, are aware that that body adopted the recommendation of a committee, which proposed that the Farmers' Assembly petition the General Assembly to compel the Visitors of the University to receive Col. Cocke's donation, which the Visitors had previously, by unanimous vote, twice declined to receive.

This action of the Farmers' Assembly, if not amounting to an implied censure of the Board of Visitors, certainly raises a direct issue between the parties, and places the Farmers' Assembly in an untenable position, as we shall attempt to show.

Before entering upon the argument, we may state that the Farmers' Assembly acted in this matter without authority. By the Constitution of the Virginia State Agricultural Society, it is declared in Section VI, Clause 2, that "a majority of their *whole* number shall be a quorum for business." This "whole number" amounts to 128 delegates, of whom only 119 were elected. The vote on the recommendation of the committee was 36 for, and 25 against it; showing an aggregate of only 61,—or four less than a quorum. According to this test, less than one-third were favourable to the proposition. Clearly, then, it cannot be the action of the Farmers' Assembly, or the wish of the Society.

Be this as it may, however, the subject has got before the Legislature, and we shall meet it there on its merits. These involve three questions: of principle; of policy; and of experience.

If "principles not men" be accepted as a cardinal maxim in affairs of government, *a fortiori*, one would think it sound to say "principles not money;" and to deduce as a corollary from that, that no individual shall purchase a private interest in a public Institution.

The organization of the University, as planned by Mr. Jefferson, is wholly and altogether public, and the property of the State. It looks altogether to State management; and nowhere provides that a private individual shall purchase an interest in it, or a right to control any part of it. It is managed by a Board of nine Visitors, appointed by the Governor for a term of four years, to whom is entrusted the administration of all its affairs. These Visitors are not removable by him, except for failure

to attend to their duties for one whole year, and are not accountable to the Governor, nor to the Legislature, for the mode in which they exercise their trust. Among their duties is that of electing Professors.

The deed of Col. Cocke, which it is proposed to compel the Visitors to accept, goes in the teeth of this organization, and proposes to change it by reserving to that gentleman at present, and after his death to the Farmers' Assembly, the nomination of the particular Professorship which his donation is to be used "*in* endowing." Sensible men will understand at once that the right to nominate is equivalent to the election, and will as rarely fail to result in the election of the nominee, as does the nomination of an Executive officer of the United States. So far, then, as this proposition goes, it changes the organization of the Board of Visitors, and affords a precedent for further innovation in the same direction.

Now why was the Board of Visitors of the University made a perfectly independent body during the term of incumbency of its members, and placed beyond the control of the Governor or the Legislature except by a change in the law establishing it? Obviously, to keep the interests of the University beyond the reach of political control or popular clamour: and not less obviously because it was deemed wise to vest the whole administration of an institution of learning in a body of gentlemen of character and experience, selected within wide limits, not numerous enough to form parties, and yet not too few to benefit by consultation. In this it differs not at all from other things, in which special interests, not within the proper scope of politics, have to be managed. In all such cases, Presidents and Boards of Directors are chosen; and if they are held to a more direct account, and within shorter periods, it is because the subject matters of such agencies are more liable to abuse.

The history of the University proves the wisdom of its plan of organization. Established thirty-four years ago, it was not until 1845 that any portion of its administration was arraigned before the public. In that year it had the misfortune to incur the displeasure of a gentleman of some prominence, whose violent denunciations caused the appointment of a joint committee of the Legislature, which repaired to the University to invite charges and institute an examination into alleged misconduct. That committee looked into the complaints, and reported them utterly groundless. Since then there has been no whisper of censure that we have heard of. So far from it, the success of the University has been signal, and the reputation of its Professors draws every year an increasing number of students from other States, and particularly from the South. For what reason, then, is the principle of appointment to Professorships sought to be changed? Where no abuse is charged against the management of an institution, which is the best of its age in the round world, why change it? We ask sober and conservative men, what is the *reason?* What the advantage to be gained? Is agricultural science so recondite that one gentleman can discover it when nine cannot? If so, why not confine it to one for the future, and why devolve it upon so numerous a body as the Farmers' Assembly? If one be a better elector than nine, are not nine better than a hundred and twenty-eight. Is the Legislature of Virginia, with its talent, experience, and length of session, competent to ascertain the relative fitness of competing candidates for Professorships? Nobody says so. Then in what is the Farmers' Assembly, meeting and dissolving in three days, and never presenting a quorum, superior to the Legislature of Virginia? Can the Governor appoint proper Professors? No. Then how can any other gentleman be supposed better able to do it? Is it that "the example would lead to other contributions to the same great object." How? Presumably on the same terms, to wit: the right to nominate, alias elect, the Professor,—for that is "the example" set. What then becomes of the unity of government at the University? Who is responsible for the government where one party nominates to office and the other controls the appointee? What sort of a farmer would he be whose overseer was chosen by another man? But suppose "the example" shall prevail. If it be desirable in agriculture, it must be equally so in other things, and is likely to be followed in some things. Suppose religious denominations, with the best motives in the world, establish Professorships, not of theology, but of other things, to get a footing there May we not have sectarianism, or a war of

sects? Shall a subtile Jesuit be inducted on the nomination of a Catholic Bishop? May it not happen in the two or three hundred years that the University is to last, that independent Professorships shall outnumber the State's quota, and individuals may control the learning, as they now control the money and the internal improvements of the State? It is plain that the proposition of the Farmers' Assembly tends to change the whole organization of the University, and expose it to all the risks of individual management or mismanagement to obtain what the committee calls "a valuable acquisition."

Even if it *were* "a valuable acquisition," in the sense of a sufficiency for its object, the farmers of Virginia should not invoke the Legislature to punish the contumacy of the Visitors and compel their acceptance. For the Legislature to do so would be to usurp authority, and to overstep the boundary of their legitimate action as defined by themselves. The distribution of powers of government is systematically established; and this proposition goes to break down those barriers which statesmen have erected, and confounds an act of *administration* with an act of Legislation. Under a just distribution of powers, the Legislature would have no right to do more than enact a general law, under which this donation might be accepted. To do more would be to judge in each case of the propriety of the particular step, which it is absurd to suppose they could do, though each man were a Solomon. If the Legislature should think differently, and act accordingly, they would soon find themselves called upon to fix the politics of the Professor as well as his special accomplishment, and to breast or bow to the clamour which some partizan or some malignant would raise at decisions of the Visitors which might not please his prejudices or his temper.

But were this donation not repugnant to sound principles, it would be to sound policy,—one of whose maxims is, never to pay more for a thing than it is worth.

Twenty thousand dollars is not sufficient to establish a Professorship of Agriculture. The terms of Col. Cocke's grant require two scholarships at his control. Here is one hundred and fifty dollars per annum expended at once. The Professor must have a residence worth three hundred dollars per annum. Fuel and servants' attendance for the lecture room are worth one hundred dollars more. These three sums represent a capital of $9166,—leaving only $10,834 of the donation applicable to purposes of instruction. Those best acquainted with the costliness of a complete equipment for a lecture room in any of the sciences, can easily imagine that the purchase of models of agricultural implements, of coloured engravings for illustrations, of specimens, of costly drawings of domestic animals to show their points, of apparatus, and of other things which cannot be specified or foreseen, will easily absorb the remainder, and leave nothing, if not worse than nothing, wherewith to pay the Professor's salary.

At the lowest estimate then, nothing is gained to the University by Col. Cocke's offer. In fact, it is entirely impracticable. So fully aware of this was the Committee which was appointed to negotiate the acceptance of this donation, that it felt itself called upon to present to the Board of Visitors "a *projet* for the establishment of the proposed school."

This *projet* is presumed to be from the pen of the accomplished Chairman, the Hon. Wm. C. Rives. No doubt his observation of the schools of other Countries has given him unusual facilities for preparing such a *projet*, whilst his prudence and sagacity would prompt him to present it upon a scale sufficiently reduced to make it practical and practicable. It, then, is what he, and the rest of the Committee thought necessary to make Col. Cocke's donation operative. Let us inquire, upon the basis of this *projet*, what will be the actual cost to the University of accepting this donation.

(1.) The University receiving only $1200 a year, is to guarantee $3000 to the Professor, with a house, or the equivalent allowance for house rent, which is $300 a year. To do this without a tax upon the College Treasury, requires 80 agricultural students, paying $25 each. It is certain that that number would not attend for several years.

(2.) The existing Professors, whose co-operation will be required, being already supported, it would not be fair, in estimating the cost to the University, to include their salaries; but every one would require expensive means of illustrating his lectures. As an instance, it may be stated that the specimens of compara-

tive osteology alone will cost more than $2000. So the additional chemical apparatus will cost some $3000. And, altogether, it may be safely said that $10,000 will be required at once, and immense additions from year to year.

(3.) The farm now owned by the University is to be given up as a model and experimental farm. That is now believed to be worth $15,000. The additions, in the way of buildings, enclosures, draining, &c., cannot be less than $15,000 more.

(4.) The salary of "an intelligent and skilful agriculturist," who is to demonstrate all the best rural processes, cannot be less than $1000 per annum, which will represent a capital of, say, $16,000.

It may then be very safely stated from the above data, that in the deliberate judgment of able gentlemen, fast friends of the measure, not less than $60,000 will be required to start the experiment, in addition to $20,000 granted for the same purpose by Col. Cocke.

Now it may be asked with what justice can the Farmers' Assembly claim that the Trustees of the State shall be called on to surrender the appointment of a Professor who is to be the head of a particular department, to a gentleman who contributes only one fourth of the amount deemed necessary to create that department Would they not be faithless to their trust should they agree to the proposition; and would not the Legislature act most unwisely should they demand its acceptance?

The University now owes a heavy debt, incurred in repairs and the erection of buildings which its success has rendered indispensable to its daily demands—the very sum which Col. Cocke offers, is money due to him on its bonds. Never a favourite with the State, it has been compelled to meets its own liabilities. With a parsimony at once unwise and discreditable, the Legislature has shaved the Professors' salaries to make revenue, thereby driving competition from intellect. It has also required, as a popular feature, and, *therefore*, a bad one, that it should give gratuitous annual instruction to some fifty young men, who are injured thereby. With such burdens, so unreasonably imposed, how can it be expected that it shall appropriate $60,000, (or one cent,) to make $20,000 available; especially, when by the very terms of the grant, the donation, which they are not to be allowed to control, must revert to the donor should it fail of its object? With what show of reason can the Committee of the Farmers' Assembly ask the Legislature to enforce a subscription of $60,000 of public money to the experiment of a private gentleman?

If still another argument be needed, we may state that a similar measure has prevailed in the State of Georgia, where a public spirited gentleman paid $20,000 and made a Professor. We have heard from two reliable sources, that the experiment is a dead failure. Why should we repeat it on a similar scale?

We do not mean to be understood as opposing a Professorship of Agriculture at the University on a wide basis. If the Legislature shall think proper to establish one or more there, we should hail it with joy and delight.

Although we have been more happy in our agricultural associations than Gov. Wise, who with rare good manners, has twice told the Farmers of Virginia, who invited him to address them, that he had derived more information on agricultural subjects from "old negroes," than all the Farmers of the State put together; yet no man, except Gov. Wise, and one other gentleman, knows as well as we do how much Agriculture needs intellect, systematically devoted to it. Our relations with the Farmers are of such a character, as to assure us of it with a strength of conviction which perhaps no other man can feel. Though there are gentlemen of fine talents and thorough education, who have devoted themselves to farming as a profession, yet there are many minds of a high order, now "rusted by a vile repose," which might find ample exercise and development in that "divine philosophy," which presides so variously over field and forest. We would see this reformed, but not inadequately, or at the expense of principle.

Neither do we mean to be understood as undervaluing the noble liberality of Col. Cocke. We beg him and all his friends to be assured that we honour his high motives of patriotism and public spirit. But we have so much respect for him, as to believe that he will equally appreciate in us the feeling which impels us to oppose a scheme that we know he has much at heart.

"Cattle Dying from Eating Corn-Stalks that Hogs have Chewed. What Causes it?"

The above question is asked us by our friends of *The Valley Farmer*, who copied our remarks on the cases of Mr. Effinger's, of Rockingham, cattle. We cannot answer the question. But we know the fact; and have given instances in the Planter in which the experiment was tried on cattle, one at a time, with a fatal result. The disease, commonly called *mad itch*, is not due solely to corn-stalks previously masticated, but has been known to occur in a cow eating pea-vines, who died not of simple *hoven*, as might be supposed, but with the peculiar symptoms of *mad itch*. Food, then, of a very high degree of succulence may, but rarely does, produce it. Nor does it seem due to the dryness of the material taken into the stomach, (or rumen, the seat of the disease,) for dry straw and stalks, which many cattle live on all winter, are not known to produce it. Possibly, though it is unphilosophical to guess, the disease is one of a very high degree of inflammation of the rumen; the fibre of the cornstalk, whose pith has been thoroughly broken down, and its juice extracted, by mastication, presenting a number of irritating points, as sharp as so many splinters, to the coats of this organ, may so irritate them as to produce at once acute disease with attendant indigestion. We have had an opportunity, on several occasions, to see a similar state of things on cutting open cattle that have died of *red water*, (or bilious fever?) In such cases, where death has occurred prior to diarrhœa, the contents of the paunch have always been exhibited in a compact dry mass; and there has been a high degree of inflammation of their receptacle. Sheep, we have been told, are sometimes affected in the same way when fed on very hard and dry forage, such as over-ripe timothy hay, which has been known to pierce through all the coats of their paunch.

Cannot the *Valley Farmer* persuade some of its grazing friends to sacrifice a scrub to science next fall, and have a regular physician to make a *post mortem?*

We warrant the scrub dies.

On the principle of "one good turn," &c., will the *Valley Farmer*, whose judicious remarks on cooked food for hogs we have read, tell the public something about steamed corn for horses and mules? Mr. Hedges advises it; and he is no doubt a very honest man, but he may be, unconsciously, like the shoemaker who said there was nothing like leather for a fortification. English experiments are rather against cooked food for horse; but to steam whole corn, shelled or on the cob, is a problem that may have elements not embraced in those they assumed to solve.

The Southern Literary Messenger.

It seems to us that if anything could quicken the zeal of Southern men for this old established Periodical of Virginia, it would be the determination of Northern literary men to out law the South.

The following from "The Atlantic Monthly," a new literary Magazine started in Boston, and to be supported by the ablest talents of that city, should arouse us, if anything can, to discard such journals altogether and build up and support our own.

It is the merited reproach of the South, in political matters, that though often defining the *casus belli*, she never presents a *casus pugnandi*. The spirit of forbearance may plead her cause with the world, under the wrongs she has endured so patiently at the hands of her enemies at the North. But what can hide her shame at continuing to sustain a class of periodicals who never lose a chance to express for us either pity, contempt, or detestation.

Is their language the expression of amity or enmity.

"No antiquity hallows, no public services consecrate, no gifts of lofty culture adorn, no graces of noble breeding embellish the coarse and sordid oligarchy (the slave States) that gives law to us. And in the blighting shadow of slavery letters die and art cannot live."

The Merinos at the Universal Exhibition (French) of 1856.

(TRANSLATED FROM THE FRENCH OF J. CLAUDE ZOL.)

With propriety we may ask why Spain, the country of the Merinos, was not represented at our recent Exposition? The Arabs and Moors of Spain are said to have collected and handed down numerous documents of antiquity to the revival of letters, and also to have transported and multiplied in Spain the breed of Merinos. The existence of the Merinos amongst

the most civilized people of antiquity is attested by many sculptures: the horns, so remarkable of the statue of Jupiter Ammon were no others than those of a Merino (*Ovis ammonides*). That fine race, destined for the sacrifices of the ancient festivals, and for the manufacture of stuffs, purple was originally from India. It would have disappeared in the midst of the distractions which accompanied the accession of Christianity, but for the intervention of the Moors—the descendants of the Phœnicians, who were not interested in the precepts of the rising church. At present—thanks to the generosity of the kings of Spain—the Merino is spread throughout all Europe. It is, therefore, tq be regretted that Spain did not come to gather, at our Great Exposition, the most valuable of premiums—gratitude.

Two sub-races—or rather, two very distinct productions—were there exhibited: the reproductive types of Austria, Hungary, Bohemia, Silesia, Moravia, &c., on the one hand; and on the other, the Merinos of France, divided into two classes—the product of the mountainous districts, and those of the plains. An elegant building had been constructed in honour of the Electoral race of Saxony. Rambouillet and Gevrolles had also their exhibition apart. The sheepfold of Rambouillet belongs to the house of the Emperor; that of Gevrolles is in the jurisdiction of the Minister of Agriculture and Commerce. I have not to speak of the Imperial sheepfold of Montcuvrel, which is chiefly occupied by English breeds and their crosses.

The English have exhibited only a small number of Merinos. The spirit of he cross-Channel breeders is at present urned to the precocious production of butcher's-meat. Thanks to this new doctrine, we now find in England neither beef nor mutton, but only veal and lamb. One breeder confessed, that for himself and friends, he fatted his animals at four years old, in order to be able to eat real beef and mutton, which was not to be obtained at any price from the English butchers. The regimen of convalescence o which a great nation has yielded itself, hreatens us also; for the English doctrine as, with us, admirers amongst the zoologists who frequent the office of the Minister of Agriculture. There were, thereore, only two exhibitors of English Merinos, Messrs. Dorrun and Sturgeon, both of the county of Essex, on the English coast.

Amongst the German exhibitors, I have heard a prince and shepherds protest against the designation of "Negretti," given in the catalogue to their Merinos, which many pretend to be originals from the Escurial. The Prince's were of this number. Amongst the Merino-breeders I shall place Princes Esterhazy, who possesses 162,000 sheep; Princes Schwartzenberg, Auersberg, Schaumbourg, Obkawitz, and Kinski. These gentlemen sent the finest animals of their flocks. Counts Larisch, Zichi Ferraris, Breuner Enkovitch, Wilhelm de Homspetsch, Valdstein, H. Daun, Oswald-Thun, Frederic Vallis, Hungadij, Stephankarolis, Miko, &c., &c. All these counts, as well as a legion of barons and great lords whom I shall not undertake to enumerate, had exhibited.

The French breeders, both of the plains and of the mountain districts, raised in their sheepfolds the animals destined for the different exhibitions. They shared equal care and equal allowances of barley and sainfoin. Never leaving the fold, the animals are unaccustomed to the influences both of the mountain and the plain; nor did we observe any difference between these two classes. Messrs Guénebaut, Godin, Achilie Maitre, Mouniot, Chaudeen Rousselet, and Gontard represented the mountain—that is to say, the Châtellonais, which is the centre of a country very productive of sheep. The Yonne and the Haute-Marne are dependencies of the circle of which Châtillon is the central point.

Messrs. Simphal, Hutin de la Lage, Hutin de Lessart, Lami. Conseil Lami, Colleau, Dutfoy, belong to the plain. The centre of their productions is in the department of l'Aine. There is also another circle there, which contains fine flocks.

Messrs. Boilleau d'Illiers, Richer and Noblet have for their chief place Rambouillet. It is to be regretted that Messrs. Gilbert à Vitteville, Cugnot à la Douarière, Lefèvre à Sainte Escabille, who supply the rams for La Côte d'Or, have neglected the exposition. It is supposed that they did not wish to compromise themselves with the descendants of their rams. All these gentlemen belong to the circle of Rambouillet.

I am far from having enumerated all the breeders of France, any more than those of Germany, who figured at the celebrated Exposition. They were in appearance as two armies, one representing the noble Electoral race—so-much-boasted animals—of delicate form, with short but fine wool, and of middling height; the other of the race called French, of large frame, and with long, thick wool, but rather less fine. The German shepherds, the Schafmeister, the princes, all profess a degree of contempt for this French race, which has not preserved the delicate type of the Merinos of Saxony. The French breeders, laughing in their sleeve, say, "It is far better to have the frame paid for by the butcher, and to have the wool doubly and trebly long and thick, because the wool-stapler does not trouble his head about the fineness. In fact, the wool of France is itself of a fine quality, approaching near to that of the Germans." This comparison is modified by an "almost;" but, in reality, the difference in fineness is scarcely perceptible, whilst the amount of produce is at least double. Besides, the French race is no longer found at Rambouillet; for that place produces short-wools. The French race is in full prosperity in the centres of production which I have already enumerated.

The German Merinos have a particular aspect. The surface of the fleece is blackish, and matted; the interior grease is rose-coloured. I have seen it orange (it must be well understood that I do not speak of the Hampshire). In the sheep-folds of the King of Saxony, they esteem such; whilst an adept of the Côte d'Or prefers white grease, and makes no account of the black, muffled surface.

Amongst the German sheep whose aspect approaches the nearest to the Merinos of France, I shall cite those of Prince Schwartzenberg; and amongst the French sheep, the lot No. 1,812, of M. Hutin, had, above all others, the ruffled and blackish surface of the German Merinos. That lot was admirable.

I have spoken of two armies; but their combats were pacific. In the meanwhile, the Schafmeisters had displayed too much dignity in not admiring the French boxes before which they passed gravely. On the other hand, some words of a shepherd of the plain districts will describe the small account which our countrymen made of the Saxony Electoral race. "If I saw," said he to me, "such a ram in my flock, I would hunt him like a wolf, for fear he should cover one of my ewes." And yet that ram was one of the occupants of the chief pen.

Rivalry was manifested under various forms. The French breeder estimated his ram at 6,000 francs; the German breeder raised his price to 15,000 francs. There was nothing but vanity in both. In reality, the price of a good ram ought not to reach that of a fine bull. A fine ram is worth from 100 to 300 francs. All beyond that is pure fancy. I have seen two Durham bulls, equal in beauty, for one of which 20,000 francs was refused, whilst the other was sold for 1,200 francs. The latter was the true value. Because a millionaire has the fancy of having, at whatever price, a ram for which he pays 6,000 francs, is it to be said that similar ones are worth 6,000 francs? Such, however, is the error—very excusable, it is true—of certain breeders interested in the question. A very praiseworthy practice, of which these gentlemen reserve to themselves the secret, consists in not giving more than thirty ewes to a ram, and of not using the ram more than two years. Upon this excellent principle, the produce of a ram will be sixty lambs. Now the hire of a ram of 15,000 francs is worth 250 francs; while that of a handsome bull, of the best French race, is only 75 cents. The folly of prices is displayed by this single comparison.

In short, this Exposition will be as profitable to Germany as to France. Messrs. the Princes would wish to share the advantages of the French race. Our breeders will make a point of not swerving from primitive types, the bearers of fine fleeces. Each will have gained by it. Perhaps the government itself would, in the midst of the vast ovine production of France, preserve some of the more pure of the Merino race of the Escurials, in order to check the errors of opinion, and lead in the path of perfection that important branch of the national agriculture.

[*British Farmer's Magazine.*

Tea Cakes.—Six eggs, 3 pints of flour, ½ pound of butter, ¾ pound of sugar, 1 teaspoonful of soda in a glass of wine or brandy, 1 nutmeg.

From the British Farmers' Magazine.

"The Mechanism of Steam Culture."

Of the varied questions now attracting the attention of agriculturists, none perhaps possesses so much interest as that of "steam culture." Men anxious for the advancement of that which is the most creative of all the arts, see in it a new power, by which they will be enabled, not only to receive a greater increase of products from land already under cultivation than that which it now yields, but by which they can bring to the service of man the waste places of the earth, raising tracts now gloomy with sad sterility to smiling corn-fields and to pleasant pastures. In view, indeed, of the wonders which the power of steam has effected in other departments, and of the triumphs which it has enabled man to gain over obstacles otherwise insurmountable, it is not surprising that the mere idea of its application to the purposes of land culture should call forth the most sanguine expectations of those interested in the development of so powerful an aid. It is a theme which is calculated to awaken the dullest intellect, and send it forth to roam in the fields of conjecture; it is pregnant with interests alike to the man of science, the political economist, and the philanthropist. In truth, it is impossible to over-rate the importance of the question of steam culture; and although men may, in the first blush of the new thought, run riot in conjecture as to its powers, and claim for it triumphs which it may never realize, yet the very least service which it is capable of performing—not here asserting that such can or cannot be effected in their own day and generation—will be so great, so pregnant with importance to us as a nation, that they may be allowed a little license in anticipating its triumphs or in describing its powers. The field of inquiry which it opens up is wide enough to compass all the flights of the fanciful, or the hard-working thoughts of the matter-of-fact man. To glance then at the projects and propositions which have been recently brought before the public in connection with this important department of agricultural economics, and the prospects which they afford of success, may be useful and suggestive to our readers.

From the title of our paper it will be observed that we propose to notice the mechanism of *steam culture*—not that of *steam ploughing* merely. The distinction, be it noted, is an important one. The first term is thoroughly comprehensive; it includes all mechanism by which the land is to be cultivated, whether this may be simply an adaptation or modification of existing implements and machines, or constructed on entirely new principles: it includes plans for adapting the new power to the old plough, and those in which this implement is condemned, and a new mode of operation, founded on new principles, proposed to be substituted for the peculiar work which it performs. The term, then, is wide enough to comprehend plans the most diverse in character and distinct in principle. The other term—steam ploughing—on the contrary, denotes at once the specific character of the plan adopted or proposed; it is a necessity of the implement employed, and defines or should define, without any vagueness, the character of the work performed.

For the purpose of our paper, the mechanism of steam culture may be divided into two classes—first, that which comprises mechanism arranged to prepare land in a manner essentially distinct from the operation of the plough, "rotary cultivators" and "digging machines" coming under this class, these being either worked by the power of horses, or made to progress over the land by that of steam specially applied; secondly, mechanism by which the cultivating implement, "plough," "rotary cultivator," or "digging machine," is dragged over the land by the power of steam. In the first of these classes the steam-engine which works the implement passes over the land, the progressive motion being adjusted to the rate of working the cultivator; in the second class the steam-power is stationary, the cultivating implement alone having motion. Leaving for after-consideration the principles involved in cultivating land, and the discussion of the best method of carrying these principles into practice, whether by means of the plough or by rotary or digging apparatus, we now proceed to the description of the most important of the patented plans of steam culture coming under the first of our divisions.

It may be as well here to note that in offering these descriptions we do not intend explaining their arrangements or the principles of their action, or to make comparisons between what may be called "rival plans;" the object of our paper being to supply the reader with a record of what has been attempted. The utility of this record we have endeavoured to illustrate and enforce in the first paper of the present series.

The reader desirous of information with reference to the early patents (the date of the first patent being as long ago as 1630) may consult with advantage a lucidly drawn-up list prepared by Mr. Burness, well known to our readers for his mechanical abilities, appended to Mr. Fowler's paper "On Cultivation by Steam, its Past History, and Probable Future," delivered before the Society of Arts, Feb. 1, 1856. We propose, for the economization of space, to notice patents of comparatively recent date only, the first selected being that of Mr. James Usher of Edinburgh, 1849 being the date of his patent. Although this machine has been already fully described in this journal, a brief recapitulation of its peculiarities may be useful here. The cultivating part of the machine consists of a series of what the inventor calls "ploughs," attached to plates or discs fixed on a central shaft. These ploughs have a strong resemblance to the ordinary plough, inasmuch as the mould-board, share, and coulter are all represented; but their action in the soil is essentially different. Understanding as the peculiar and unvarying result of the common plough the turning over of the slice of the earth, and laying it at a certain angle, the "tilling" part of the machine now under consideration can scarcely be called ploughs, as the work they perform is essentially distinct from that of the ordinary plough. As the discs to which those tilling parts are affixed revolve, the

points of the shares and coulters penetrate the earth, tear it up, pass it over the mould-board, and leave it in an inverted state on the soil. The action is therefore more, as we understand it, a stirring than a ploughing of the soil. There are three tilling parts attached to each disc, each of which comes successively into action; and as there are several discs on the main shaft, each with its set of "tilling parts," the "ploughs" are so arranged that no two of them come into action at the same time. These "tilling parts," however, serve a double purpose: they act as propellers also; for as the paddles of a steamboat enter into and are resisted by the water carrying the boat along, so in like manner do the tilling parts of Mr. Usher's machine enter the earth; which offering a resistance, causes the machine to which the tilling parts are attached to progress over the land. Thus by the ingenious adaptation of a mechanical necessity two important purposes are attained—first, progression over the land to be ploughed bringing successive portions of the soil under the action of the ploughs; and secondly, the accurate self-adjustment of the speed of progression to that of the ploughing or tilling implements. It is unnecessary here to describe the gearing by which the motion of the engine is communicated to the central shaft bearing the plough discs: suffice it to say, that the inventor seems to have well considered the whole of the mechanical arrangements, so as to meet all the inquirements of practice. Thus, for instance, by a simple arrangement the depth to which the ploughs penetrate the soil can be easily adjusted; or they can, if necessary, be lifted up completely out of contact with the soil. An arrangement is also provided, by which the machine when at the headlands can be turned in a comparatively small space.

Taking the patent machines in the order of their dates, we come now to describe the "rotary" cultivator of Mr. Bethell (Dec. 3, 1822, No. 949; the cost of the specification of this patent is 10½d.; it is illustrated by three plates). The general arrangement of the machine is somewhat similar to that of Mr. Usher's. The digging part of the apparatus—consisting of a drum or shaft, round which are arranged in a vertical direction a number of prongs or tines—is placed behind the machine, and receives motion from a horizontal steam-engine, through the medium of drums and belts. The depth to which the tines of the digger operate is regulated by a screw shaft, worked by a handle, as in the machines above noted. On the end of the fly-wheel shaft a pulley (A), or drum is fixed, round which passes a belt, giving motion to a pulley, a little in advance, and below the fly-wheel shaft. This second pulley (B) is fixed on the shaft or axle of two lever arms, at the outer end of which the shaft of the digger is placed. A pulley (C) on the digger shaft receives motion by means of a belt or rigger from the pulley (B). As the depth to which the tines work is lessened or increased, the lever arms fall or rise accordingly, and the relative position of the two pulleys (B and C) are maintained, so that the belt is always tight.

The inventor stated at the recent meeting of the Society of Arts, that he had been experimenting for three years with this machine, at a large expenditure of money; but the experience he obtained was such as to induce him to believe he had succeeded: he stated also that he had designed a new engine, which would work as high as 100 lbs. to the inch. The following is an extract from the inventor's statement: "It dug like Parkes's forks, and left the ground in a perfect state of tilth after one operation; it threw the earth up into the air, the earth falling first because the heaviest, and the weeds coming up upon the surface. They had no difficulty in working about four or five acres a day with that machine. It dug down to the depth of nine inches, and farmers who had seen it working had stated that it did as much in one operation as would require two or three ploughings to perform, besides scarifying, harrowing, &c." The estimated cost of its working was about 9s., whereas 23s. was stated to be the cost under the ordinary mode. The machine is hauled over the ground by horse power, that of the steam-engine being employed to work the diggers only. A complete adjustment therefore between the progressive velocity of the machine over the land, and the rate of working of the diggers, is not attained. It will be noted also that the action of the machine is such as to leave the weeds uppermost—a questionable result. Not the least important office, as some think, performed by the ordinary plough, is the complete inversion of the soil, so as to bury the surface material."

In continuation of our subject, we now come to describe the general arrangements and mode of operation of Mr. Romaine's machine, so well known through the exertions of Mr. Mechi, who, on its first introduction into this country—for it is Canadian in its origin—augured great things to agriculture from its use. It has also attracted considerable attention, from the fact that it is the machine which is aided by funds expressly voted by the Canadian Legislature, anxious as it is practically to promote cultivation by steam. It is as well to note here, that although the expectations of the inventor and his friends have not been fully realized, still every effort is being made to perfect the details of the apparatus; and the inventor is sanguine, we believe, of success. At the Agricultural Exhibition at Paris, although not fully prepared to exhibit, Mr. J. Evelyn Denison, M.P. (who drew up the Report of the Exhibition at the request of our Government), reports to have seen it in a field near Paris "carrying its own boiler and engine, travel by its own locomotive power 100 yards up the field, and break up and cultivate the land in its course."

Mr. Romaine's machine is secured by two patents, one under date May 10th, 1853, No. 1151; the other Jan 6th, 1855 (the price of the specification of the first 1s. 2½d., the second 1s. 1d.). In the first patented machine, the steam-engine, as in Mr. Bethell's (described in No. IV.), worked the diggers only, the progression over the land being effected by horse-power. This defect—for defect assuredly it is, for employing steam as a mere auxiliary to horse-power is but half work—was obviated in the second patent, in which means were secured by which the

steam-engine gave locomotive powers to the apparatus. The arrangements of this second improved machine we shall alone describe.

The motive power consists of two horizontal engines, between which a vertical boiler is placed, the digging apparatus working in front of these engines, but at a lower level than the framing on which they are supported, the framing branching downwards to afford a bearing for it. The framework is supported at one end by a drum working on a horizontal shaft, this drum serving at once as a "land roller" and to support a portion of the weight of the apparatus when at work. In advance of the digging apparatus, and nearly in a line with the centre of the vertical boiler, bearings are provided in the framework for two large loose wheels; these have very broad tires, in order to prevent them sinking into and poaching the soil. The whole framework vibrates on the axles of these driving wheels; and a tipping apparatus is provided, by which the end can be raised or lowered, thus adjusting the depth to which the cultivating cutters enter the ground. In contact with these main driving wheels, two rollers, a little longer than the breadth of the tires, work: the peripheries of these rollers are covered with india-rubber or other elastic material. These rollers are made to revolve by the action of the steam-engine; and the friction arising between these peripheries and those of the main driving wheels causes the latter to revolve; a progressive motion is thus given to the machine, and the cutters of the cultivating part are kept up in the soil on which they are to operate. By proper gearing the rollers can be made to revolve in an opposite direction, thus causing the main driving wheels to revolve backwards, and to release the cutters from operating on the soil.

The digging apparatus consists of a cylinder supported on a central shaft, working at right angles to the length of the frame work; to the cylinder are bolted a set of radiating arms, these cleansing the knives or cutters which act on the soil. The radiating arms are set at equal distances in the cylinder, and the knives or cutters are so arranged that in the revolution of the cylinder they are most favourably disposed for entering the earth—they are set either to run parallel with the shaft or axle of the cylinder, or to run spirally or inclined thereto. The knives may be formed in double irregular lengths, so as to present points and inclined surfaces to the earth during working. The digging cylinder is worked by the engine as follows—the bearings which support the horizontal axis of the cylinder affords space above for two "stops," in which the lower ends of two vertical shafts revolve, the upper end revolving in pedestials attached to the horizontal part of the general framework. To the upper extremities of these shafts cranks working horizontally are keyed in, to the crank pins of which the connecting rods of the two horizontal engines are jointed. Mitre or bevel wheels are keyed into the lower extremities of the vertical shafts, and locked into similarly pitched bevel or face wheels, fixed to the extremities of the axle of the cutting or digging cylinder. These latter wheels are connected within the open ends of the digger cylinder, so that the latter can work close to the ground without interfering with the action of the gearing. The vertical shafts also give motion to the rollers previously described, which act upon the main driving wheels. This is effected through the medium of mitre-wheels keyed on the vertical shafts at a point near the middle of their length; these take into bevel-wheels of like diameter, keyed on the end of horizontal shafts revolving in bearings projecting from the sides of the framework. These horizontal shafts have clutches and double-bevel pinion arrangements for driving intermediate bevel-wheels in alternate directions. These intermediate wheels are keyed on, one to each extremity of the shaft, on which the rollers with India-rubber peripheries are fixed. By means of the clutch the main driving-wheels can be driven either backwards or forwards: keeping the cutters up to their work, or releasing them from their action in the soil.

We now come to notice the steam cultivator patented by Mr. Candos Wren Hoskens, well known as the author of "Talpa, or the Chronicles of a Clay Farm." (Patent dated Aug. 13th, 1853; No. 1899. Price of specification 8½d.) The principle upon which the machine works is so graphically described in the work above alluded to, that we cannot do better than here extract it: "Imagine such an instrument (a revolving-toothed instrument, with a space as broad as a hay-tedding machine or Crosskill's clod-crusher), not rolling on the ground, but performing independent revolutions behind its locomotive, cutting its way down, by surface abrasion, into a semi-circular trench about a foot-and-a-half wide, and throwing back the pulverized soil (as it flies back like the feet of a dog scratching at a rabbit-hole); then imagine the locomotive moving forward in the hard ground with a slow and equable mechanical motion, the revolver behind, with its cutting points (case-hardened) playing on the edge or land-side of the trench as it advances, and capable of any adjustment to cause a fine cutting; moving always forward, and leaving behind, granulated and inverted by its revolving action, a seed-bed seven or eight inches deep; never to be gone over again by any implement, except the drill, which had much better follow at once, attached behind with a light bush-harrow, to cover the seed." Reserving for future discussion this principle of action, we shall proceed very briefly to describe the method by which the inventor proposes to apply it practically to the cultivation of land, as illustrated in the patent to which we have already alluded. The framing of the machine is supported at one end by two main driving wheels of broad tire, and at the other by two steering wheels, also with broad peripheries. At the back end of the frame the steam-engines, of the horizontal class, are placed; the boiler—a vertical one—being at the opposite end, near the steering wheels. The framing near the engines takes a burst forward and downward, and provides, at its lowest extremity, bearings for the horizontal shaft of the "tiller;" this consequently works a little below the centre of the main driving wheels, and at some distance in advance of them. The shaft

of the tiller works at its extremities in bushes, which are not permanently fixed in the framing, but slide up and down in guides or slots made in it. To these bushes screwed rods are connected, these being carried upwards, and provided at their upper extremities with screw wheels, which take into endless screws keyed to the extremities of a horizontal shaft revolving parallel to the shaft of the digger. A winch or lever is attached to this horizontal shaft, by turning which the endless screws actuate the screw-wheels, and raise or lower the bushes in which the shaft of the tiller revolves; by this means the depth to which the cutters penetrate the soil can be easily regulated. Motion is given to the tiller or digger shaft by means of an endless gearing-chains, which pass over drums keyed to the end of the main shaft of the steam-engine, and to the ends of the digger shaft. The relative speeds of the engine-driving shaft and that of the digger may be regulated by changing the diameter of the charge wheels. The progressive motion of the machine is maintained thus: to the axle of the main driving wheels a large bevel wheel is keyed, this gears with a smaller wheel keyed to the lower end of a shaft set angularly, to the upper end of which a screw wheel is fixed, this taking into an endless screw in the centre of the main driving shaft of the steam-engines. The motion of the cutter or digger, and the progressive motion of the machine, being thus derivable from the same shaft, an accurate adjustment is capable of being made between them. Means are provided by which the revolving action of the cutter or digger can be maintained whilst the progressive motion of the machine is stopped. The "tiller" is formed by a series of discs fixed in a central shaft; each disc carries at the extremities of a diameter two cutters, the extremities of which are shaped like the cutting tool of a paring or slotting machine. These cutters move in slots made in the arms of the disc, and are capable of adjustment—that is, of being brought nearer to, or further from, the periphery of the disc. The discs are so arranged on the shaft, that the whole breadth of the cutters which they carry act in succession in the soil; by this means they have a self-cleaning action, and, as they lap with one another, no interspace of soil is allowed to escape unsevered from the land-side, or transferred to the back of the trench, which is thus kept clean by the action of the instrument. In bringing the machine into operation, the cutter, or digger, is placed clear of the ground; the engine is then set to work, causing the digger to rotate. The winch, or handle, of the endless-screw shaft is then worked so as to cause the bearings of the tiller shaft to descend in the guides; the cutters are thus brought gradually in contact with the soil, and the trench formed. The locomotive gear is then put in action, when the progressive motion of the machine commences; and as it advances over the land, the cutters abandon the soil in its progress. "This adaptation," says the inventor, "of the motion of progression to the velocity and capabilities of the tilling instruments forms a prominent feature of my invention, and without it a proper degree of cultivation cannot be effected."

We now turn our attention to the machine of Mr. Ford,* which has for its object to cultivate the ground by a series of spades or forks, to work which the power of steam is applied. The mechanism by which the movements are effected is peculiarly ingenious, and well deserving the attention of the agricultural inquirer; it is so complicated, however, that drawings will be necessary, to make them clear to the reader. In the absence of these, we must be content with presenting a short abstract of its principal movements.

The trenching three-pronged forks are attached to a central axis (A), which revolves on bearings or collars (B), these being supported by and capable of sliding up and down, in the slots of a curved frame (C). The sides of this frame have racks into which endless screws (D) take, the screws revolving on studs in the collars or bearings (B). The extremities of the screws (D) are fitted with small bevel wheels, which take into a similar wheel fixed on the ends of the shaft or axis (A), this being provided at each extremity with a small hand wheel (E). By turning either of the hand wheels (E), the endless screws (D) are made to revolve, which take into the racks in the inside of the curved frame (C). By this means both ends of the shaft or central axis on which the diggers are fixed may be raised or lowered simultaneously, and its parallelism insured. The curve of the frame (C) is struck from the fly-wheel or crank shaft (F) of the horizontal steam engine (G). The digging frame is composed of a pair of wheels (H) fixed on the extremities of a hollow axle, revolving freely on the central axis (A); the arms of these wheels are slotted or grooved, the shafts of the spades or forks sliding up and down in these. The peripheries of the wheels (H) are provided with ratchet teeth, into which levers or palls (I) gear; these levers are actuated by eccentrics or cranks (J) fixed on the main shaft (F). The throw of the eccentrics (J) is so arranged that each upstroke of the levers or palls (I) shall lift the spades or forks from the ground, and bring forward the next set of spades or forks, ready to be pushed along the groove or slot of the arms of the wheels (H. The spades are pushed into the earth in a manner corresponding with the action of the foot in "hand-digging," by what the inventor calls "treaders;" these work in guides, the extremities of which bear on and work loosely upon the crank shaft (F) and the collars (B). The "treaders" have the necessary reciprocating movement in the slides given to them, by means of cranks fixed on the main shaft (F). As the wheels (H) revolve, they lift the forks and their portion of earth upwards; and another movement of the machine turns the shaft of the fork round, so as to completely turn over the slice of earth. This turning-over movement of the forks is effected as follows—to the shank of the fork turning sockets are fixed, and the upper extremities of which are fitted with small toothed

* Patent dated June 12th, 1855, No. 1343; price of the specification 2s. 10d. The letters within brackets, as (A), are added to facilitate reference to the various parts of the mechanism.

wheels (K); these are actuated by sliding bars provided with racks (L) jutting into the teeth of the cog wheels (L′). The sliding bars are moved by guides or grooves (M) fixed to segments (N), which form guides or rests for the traverse of the spade-bar after it has been pushed into the ground by the "treader." These guides (N) are attached to and carried forward by the wheels (H). This groove or slot (M) being stationary with respect to the revolution of the digging frame (H), will impart a lateral motion to the sliding bars with their racks (L), when their ends pass above that portion of the grooves (M); but they will be held stationary when passing along or over that part of the groove (M) which is straight or parallel to the plane of revolution. This groove or slot (M) is also carried beyond the segments (N), by fixing it to the collar (B), so as to work the sliding bars through the entire revolution of the digging frames; or inclined bars (O) may be made to project from the inside of the wheels (H) of the digging frame, and then as they revolve, made to come in contact with lugs projecting from the sliding bars or racks (L). The inclination of the bars (O) is such as to actuate the sliding bars (L) a sufficiently long time that the rack may turn the cog wheels (L′), and of course the fork shafts to which they are keyed, completely over or half round; and then to turn them a quarter of a revolution back again. They are held in this position until they pass edgewise between clearers (P). These are fixed on the shaft of the leavers or palls (I), and have thus a reciprocating motion given to them. On the forks passing through between the clearers, they are passed with the slots or guides in the arms of the wheels (H); when by another inclined surface in the guides or grooves (M), or by the inclined bars (O), they are turned into the proper position to enter the ground, and are passed down the slots and made to enter the ground by the action of the "treaders."

The direction in which the forks are made to turn over may be changed as desired, in order that they may either turn over towards each other in pairs, or in any other direction, and thereby deposit the sods or spits so as to form furrows or ridges, or leave the ground flush or bare. This is effected by having an upper or under bar (M) with rack gearing into the cog-wheels (L′) at opposite ends of their diameters; so that the direction in which the diggers turn depends upon whether the upper or under bar is in gear with the toothed-wheel (L′).

The diggers are kept up to their work by giving an intermittent traverse motion to the whole machine; this is obtained from eccentrics or cranks in the main shaft (F) working rods, in the extremities of which are palls working into ratchet-edged pulleys fixed on the main driving-wheels.

When the machine is to be transported from one place to another, motion is to be given to it by a belt passing over a small pulley in the main driving-shaft (F) of the engine, with a larger pulley on the axle of the driving-wheels—an arrangement of pulleys and belts being used to drive the main or front wheels, which are used to steer or guide the machine in its progress.

Mr. Ford, in the same patent, describes other arrangements of mechanism, by which the operations of harrowing, clod-crushing, forming of furrows, and hoeing may be performed by the power of the steam-engine which works the diggers already described. The various implements necessary to perform the above operations are capable of being easily adjusted to the curved frame (C). In removing an implement from this frame, it should be lowered by the small wheels (E) and screws (D) until it touches the ground; and then the working gear of the main shaft detached, and the sides of the curved slot removed by unbolting—the process being reversed when an implement is to be put into the curved frame (C). We here give a brief notice of the peculiarities of the different implements; and first of the "cleaning harrows." A series of projecting prongs or spikes are fixed to a number of bars, these being jointed at the ends to two endless gearing chains, supported by and running upon two pulleys. One of these is attached to the upper end of the curved frame (C), the other to the lower extremity of a bar jointed to the frame at its upper end. This bar projects at an angle from the frame, so that its lower extremity is in advance of and considerably below the level of the upper pulley. A set of cleaning chains are placed on the outside of the bars of spikes, one on each side of every row. These chains pass in direct lines from pulley to pulley, not at one point; the gearing chains, with their attached bars, pass over a small pulley, which causes them to be lifted up, passing the spikes from the crown to the point along the cleaning-chains, which thus free them from all adhering matter. A receptacle is provided for the weeds; and the lower pulley can be raised or lowered by a winch, so as to regulate the depth to which the spikes work.

The "clod divider" consists of a horizontal shaft revolving in bearings provided in a hanger or bracket suspended from the curved frame. Motion is given to it by a belt passing over pulleys, one of which is keyed on the main shaft (A), the other to the centre of the horizontal shaft. To the latter a series of prongs or cutters are attached, these revolving between other cutters which are fixed to the hanger or bracket. The clods brought up by the action of the revolving cutters pass between them and the fixed cutters, and are divided, the fixed cutters tending also to relieve the revolving ones of extraneous matter. Three bars are provided between the cutters, to prevent the clods flying too much, or being scattered by the rapid rotation of the revolving cutter.

Of the steam-cultural implements invented by Mr. Ford, we, at the conclusion of our last article, described two, the revolving or "cleaning harrow," and the "clod divider." We have next to notice the arrangement of mechanism, which he terms a "furrower." From the description of the steam-digging or trenching apparatus, which we have already given, it will be seen that the land will be left without any of the regular divisions of surface which are the result of ordinary ploughing. To give these to the land dug or trenched by his steam-digger, is the work of

the "furrower" invented by Mr. Ford. To the lower end of the curved frame of the principal part of the machine containing the motive power, two brackets (A A′) are suspended at a short distance from each other; these carry two bars (B B′) which are thus parallel to each other. The two brackets (A A′) are joined to the framing, and to the inside of the parallel bars (B) a lever or rod (C′) is fixed, the upper end being fixed to the main shaft of the machine (marked C in our former description). By turning the shaft the lever (C′) may be raised or lowered, and with it the lower extremities of the brackets (A A′) and the parallel bars (B B′). A series of double turn-furrows, the lower extremities of which are shaped like the letter V, is connected with the bars (B B′), turning at one end, in a vertical direction, in eyes through which the bar (B′) passes, the other ends being adjusted by pins in the second bar (B). By raising or lowering the brackets (A A′) by the lever (C), and by adjusting the turn-furrows on the bars (B B′), furrows of different sizes and depths may be obtained.

The hoes, which can be attached to the main machine whenever this operation is required to be performed, are of two kinds, the "horizontal revolving" and "vertical revolving." In the former a series of vertical spindles (A) revolve in bearings or sockets attached to two horizontal bars (B C) placed one above the other. The lower extremities of the spindles carry (A) the hoe-cutters (D), of a circular, curved, or straight form; these cutters being also supported and the spindles (A) steadied by guard-brackets fixed by screw bolts to the lower bar (B). A shifting-piece joined to each guard-bracket is so adjusted that the cutter just touches it while revolving. By this arrangement the cutter is kept clean. This cleaning of the cutter is also further attained by making it revolve within a short distance of the bottom of the guard-bracket. A rapid motion is given to the spindles (A) by an endless belt passing round and between small wheels or pulleys fixed to the spindles; this belt receives motion principally from a larger pulley fixed on the main shaft of the machine. By means of a lifting lever attached at one end to the horizontal bar (B) and to the main shaft of the machine, the depth to which the hoes cut can be easily regulated. As the lifting of the hoes, however, by means of the lever, would cause them to rise from the ground in a curve, the centre of which would be the centre of the lifting lever, means are provided, by the application of jointed levers resembling the parallel motion of the beam steam-engine, by which the hoes, however raised from the ground, always maintain a vertical position. The arrangement of the mechanism of the revolving hoe presents a strong resemblance to the spindles and bobbins of the cotton roving or stabbing frame. In the vertical hoe the working of the earth is effected by a series of three-armed discs, keyed on to a horizontal shaft, the extremities of the arms being provided with cutters: shields are provided to hold down the earth while the hoes are working through it. The patent also describes a hay-collecting and hay making apparatus, and a machine for digging deep drains: these the nature of our article precludes us from noticing; but we name them here, as they may interest some readers who may wish to consult the specification.

We now come to the consideration of the second class of steam cultural mechanism—namely, "mechanism by which the cultivating implement, 'plough,' 'rotary cultivator,' or digging machine, is dragged over the land by the power of steam." Before, however, proceeding to describe the patented machines by which this "traction" is proposed to be effected, we deem it advisable to describe a few of the implements which seem to be peculiarly, or are specially, adapted for this method of "steam traction." These will comprise rotary cultivators, and special arrangements of grubbers, scarifiers, or ploughs.

The first machine of this class to which we direct the attention of the reader is that invented by Mr. Bernhard Samuelson,* the well-known agricultural implement maker, of Banbury. It enjoys considerable reputation as a good pulverizer, and a "cleaner" of the soil, bringing the couch-grass and other weeds to the surface, ready to be collected by the harrows or by hand.

In this machine, the tines or forks are intended to act after the manner of the trenching-fork or spade, and are made of steel (cast or double-shear steel, not hardened) throughout—at least, at the parts exposed to strain in passing through the soil. A curve is given to them, so that the extremities shall enter the ground almost perpendicularly; and their section is square or diamond-shaped, set on the angle, so as more easily to break any extraneous substances (as stones) which they may meet with in the ground. Their extremities are pointed, like a fork or like a chisel, being more of less acute, according to the soil to be dealt with and the depth to be penetrated. The fork-point has, however, been found to act well on all soils. These prongs or forks are found to penetrate the soil by the mere weight of the machine; the inventor stating that, with a weight of 18 cwt., the prongs are forced into the ground, in ordinary soils, to a depth of 10 inches, and that, at this depth, their strength is such as to resist any strain caused by the draught of as many horses as can be practically applied to the machine. The steel-forks or prongs (A) are fixed at their upper ends between two discs (B), bolted together, six pairs being apportioned to each pair of discs. The prongs are made in pairs, with a curved junction, so as to be more firmly bedded between the discs. A number of these discs rotate freely on a central shaft (C); and between each pair, and rotating on the same central shaft, a ring (O) is placed, which keeps the discs apart, and clears their side-surfaces from adhering soil. The circumferences or peripheries of the discs are also kept clean, and the soil kept clear from the prongs, by "cleaners," (E) hung freely on a shaft (F) placed above and a little behind the shaft (C) on which the digging wheels (B) rotate. Each "cleaner" (E) is in contact with the circumference of two half-centres

* Patent dated November 2nd, 1852; No. 621. Price of the specification, 9½d.

of the discs (B), and is also provided with a projecting tongue, which passes into the space between adjacent centres, and limits its lateral play upon the shaft (F) on which it is hung. The cleaners (E) are provided with weights at their extremities, to keep them to their work.

The "digging discs" (B), the "rings" (D), and the "cleaners" (E), are all connected to an inner frame (G), which is itself hung to a front bar, which front bar connects two frames (H H), one on each side. These frames are provided—at the end opposite that at which the horses are attached—with toothed quadrants (I I), and support the wheels (K K) on which the whole machine travels from place to place, and which also serve to regulate the depth to which the prongs are allowed to enter the ground. At the back part of the "inner frame" (G), which bears the diggers (B), a shaft (L) revolves in suitable bearings. At each end of this shaft (L) pinions (M M) are keyed, which take into the toothed quadrants [I I]. Near one extremity of the shaft [L], a bevil wheel [N] is keyed, which takes into a bevil pinion [O] fixed on the end of a shaft [P], which is turned by a handle [R] at its extremity. By turning this handle [R] the bevil wheel [O] causes the shaft [L] and the pinions [M M] to revolve, the latter ascending or descending, according to the direction in which the handle [R] is made to revolve the tooth quadrants [I I], and causing the inner frame [G] to be raised, with its discs [B], rings [D], and cleaners [E], nearer to or further from the ground. The inner frame [H] and digging wheels [B] can be maintained in any desired position with relation to the travelling wheels by a "pawl" [S] taking into a ratchet wheel [T], cast on to one of the pinions [M M].

On proceeding to its work, the digging discs or wheels [B] are raised sufficiently by the means above described, to keep the prongs from contact with the soil; and are kept in this position by the "pawl" [S] catching the ratchet wheel [T.]. On reaching the place to be dug, this pawl is thrown out, when the weight of the inner frame [G], with its digging discs [B], &c., will cause the pinions [M M] to run down the toothed quadrants [I I], and the digging prongs or forks [A] to enter the ground. The degree of penetration requisite is regulated by the handle [R], so as to depress the inner frame [G] less or more. The utmost extent of depression given is that which depresses the prongs up to the centre plates or discs; in this position the travelling wheels are lifted off the ground, and maintained by the pawl [S].

As the machine is dragged forward, the resistance offered by the earth in front of the prongs causes the latter to revolve, and portions of the soil to be detached, which are thrown back, after being lifted and broken up, by the action of the cleaning bars [E]. As before-mentioned, a full-sized machine weighs nearly a ton, and breaks up to a depth not exceeding ten inches, a breadth of three feet at a time, equal to that of four ploughs, and equivalent to about five acres in seven hours. The price of the machine is £27 10s. The draught required varies with the nature of the soil from four to seven horses. A smaller implement is made for occupations where the horse-power is limited.

With reference to the cultivating capabilities of the machine, Mr. Samuelson, in a paper read before the British Association, remarked:—"I think it right to state that it possesses, in common with all other rotary implements hitherto made, or proposed, this disadvantage, as compared with the plough—that it does not completely invert the soil. I believe, however, that the occasions for such inversion are much more rare when we work with an instrument which leaves the ground broken, hollow, and mixed, like the digging machine, than with one which, like the plough, cleaves off a slice and exposes its superfices only to the air; there being, in fact, this essential distinction between the two machines—that one allows the air and water to descend; whereas, in the other, fresh soil must always be brought up, if it is to be acted upon by the elements."

Horn-Dust.

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The first consists entirely of horn in a state of great purity, but the second contains 16 per cent. of sand, and a much smaller quantity of ammonia. The former, reckoning the ammonia and phosphates at the usual rates, is worth exactly £9 per ton, and the latter only £6, 7s.—*British Journal of Agriculture.*

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For the Southern Planter.

The Drilling of Part of every Pea-Crop, both a Benefit and a Necessity.

In the three years which have passed since my communicating to the Virginia State Agricultural Society an article on the "properties, value, and culture of the Southern Pea," my experience and observation have enabled me to correct some of my then errors of opinion, and of practice. Such errors, and the consequent false teaching, when likely to mislead other persons to their loss, it is the duty of every writer to correct—as I will now attempt.

When formerly treating this subject, I preferred and practiced broad-cast culture, without exception. For while admitting the superior productiveness, in seed, of drilled and tilled ground, I then supposed that broad-cast sowings would always yield enough seed for the next crop, and a better general return for the labor employed altogether. This opinion was then opposed to the general practice of North Carolina, which was drill-culture, wherever the pea-crop occupied the ground exclusively. While still preferring broad-cast to drill-culture for the larger portion of the pea-crop, and when it is especially designed as a manuring crop, I have latterly learned to admit my former mistake, and the superior advantages of drill-culture, for a portion of the crop—and for all very early seeding, and for as much of the field as will supply plenty of seed, or as is desired to be gathered.

When land is in the best condition of pulverization, tilth, cleanness, and degree of moisture—and the weather is warm enough, and the season far enough advanced, for peas to sprout quickly, and then to grow rapidly—it will be safe, and also the cheapest and best mode to sow broad-cast. Especially is this mode preferable, under these circumstances, when the crop is wanted merely to be ploughed under, as manure for the land, and preparation for the next succeeding crop of wheat, or cotton. Under the favorable conditions stated, and with ploughing and sowing not too early, a good growth and cover may be expected, and a clean crop, to be obtained by this most rapid and least costly mode of preparation and seeding, and without any subsequent labor or care. It is true, that the richer the land, and the thicker and ranker the growth of vines, the less abundant usually will be the product of perfect pods and seeds—if not absolutely less, at least relatively, or in proportion to the general growth of vines. This deficiency, however, may not be very important, when all the product is to be ploughed under for manure.

But even when all the conditions for seeding are deemed favorable, wet and cool weather, succeeding the sowing, may check the growth, and cause the fox-tail grass, on stiff soil, and rag-wort and other worthless weeds of lighter soil, to spring among and out-grow the pea-plants—and, in proportion to their prevalence, to take their place, and prevent the production of the crop of peas. And this substitution of worthless weeds for a valuable crop, will be much more general when (as is unavoidable in many cases of large sowings,) the conditions of time, season, and soil, were more unfavorable. Hardy as is the pea-crop after it has been well started in growth, it is ill able to withstand cool weather when very young. And a cloddy (though well ploughed and clean) soil, if hot and dry, is as injurious to the springing of late-sown peas. When this crop is sown broad-cast largely, or occupies one field and year of the rotation of the farm, it is almost impossible to prevent a large portion suffering from one or both of these different evils. In the climate of lower Virginia, (or of the lands next below Richmond,) it is too hazardous to sow peas (broad-cast) before the 20th of May—and it is much safer, and better for the crop, if the sowing is embraced in all the month of June. If beginning any earlier, a cold spell of weather may soon after occur, and suspend the growth of the young plants, while the hardier weeds and grasses, less impatient of cold and wet, grow and get ahead of the peas, and prevent much of what otherwise would be their subsequent growth and luxuriance. Still more, there are innumerable small bugs, (spotted beetles,) which prey upon the leaves of the young pea-plants, eating holes through the seed-leaves, and from whose depredations scarcely a leaf escapes under these circumstances. This is the only insect plague, or disease, that I have observed to damage the pea-crop. These insects always attack the young peas, especially when in the seed leaf. But when the weather is warm, and the young plants are growing rapidly, these depredations are scarcely perceived, and cause no appreciable injury. But when cold weather checks or stops the growth, the insects are very destructive, and (with the aid of the fast-growing weeds,) will nearly destroy a previous thick stand of pea-plants. If, to avoid this frequent ill consequence of early sowing, the farmer waits for settled warm weather, he is as liable—indeed almost sure—to meet the equally great evils of soil too dry for good preparation, a cloddy seed-bed, and consequent failure of numerous seeds to sprout, or sprouting merely to die for want of moisture for their as yet superficial roots. Besides, in all June there is so much of other and important labor required, that no farmer can then prepare for, and sow, an entire field in peas. And after our wheat harvest is begun, nothing else can be attended to, until it is finished. Afterwards, it is too late to sow peas, for their full maturing, and their best manuring products. Still, (on wheat-stubble especially,) all other conditions are so entirely favorable to the ploughing, seeding and growth, that our cleanest and most profitable covers of broad-cast peas, for preparation

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for wheat, are obtained from such sowings, made immediately after removing the previous wheat crop, and not later than July 10th. But because of the heavy demands for labor, at that time, on a wheat farm, this excellent practice cannot be extended over much space.

On these grounds, while I still prefer, and recommend to others, broad-cast sowing for all land sown in settled, warm weather, and in good and clean order, I now advise drill sowing, and some subsequent cultivation, for all the earlier (and otherwise too early) seeding. The ready objection to this is the greater amount of labor required. It is true, that, for the space sown, drill-culture requires much more labor; but much less, if compared with the amount of crop grown, and the ease of securing it for use. If, by too early sowing, (for any particular season,) part or all of a field sown in peas is over-run by tall weeds, and but few pea-plants survive, it may by courtesy, be designated as "pea-fallow;" but, in fact, it is merely a weed-fallow, on which the labor of preparation and the sowing of peas, have been expended almost uselessly. No kind of culture can be more expensive and losing than this, no matter how small the outlay to the acre. And in this way, to more or less extent, every extensive broad-cast sower of peas must suffer in every year. On the Marlbourne farm, in some years, the the very general over-running, or smothering, by weeds, of the earlier-sown pea-crop, has occurred on from one-third to more than one-half of the whole field, or greater breadth of sowing. In such cases, the loss of the crop as manure is not all. At least twice as much seed is required for broad-casting as for drilling—and the vines thus over-topped by weeds, will not yield enough peas to pay for the gathering. And even on the parts of the ground where the growth of pea-vines is clean and unmixed with weeds, yet if it is very thick and luxuriant, there are often too few pods and seeds to be worth the cost of gathering, Such is generally the case this year—and almost entirely on the farm mentioned.

If, then, the different labors of broad-cast and drill culture are compared, (not as to the extent of surface severally so treated, but) in regard to the products from each, it will be found that the drill mode of culture, for all early sowing, is much the cheapest and most profitable. For it is safe to drill some length of time before it will do to trust to broad-cast sowing. In either case, the young plants are equally checked by cold weather—and while so suspended in growth, are equally liable to the depredations of bugs. But, during this time, while hardy weeds are growing equally among and over topping both, they will remain to smother the broad-cast peas, but will be destroyed by the slight subsequent tillage of the drilled plants. If these but barely keep alive until warm weather comes, and they are then tilled, the weeds are killed, and the peas will grow and thrive well. I witnessed this process, with these results, this year, in a row of peas planted very early, and of which the young plants were so damaged by cold and insects, that they would have died if left without weeding. But with very slight and early tillage, this row not only speedily and entirely recovered, but was remarkable for its good products.

Now, I do not advise the abstracting of a single day from the time proper and safe for sowing peas broad-cast, to be given to the slower method of drilling and subsequent tillage—but only the earlier time, which would be unsafe for broad-casting. Whatever may be the time deemed safe to begin the latter operation—whether May the 20th, or June the 1st,—drilling might have been begun safely some ten days earlier. For so much of the field as could have been drilled in this time, the land might have been ploughed at any leisure time of the preceding winter or early spring; and these ten days, so given to drilling, would be a time when there is much less demand for labor than afterwards, and during which nothing else could have been safely done in seeding peas. These ten days, and thus in advance, would enable a farmer to drill one-fourth of his field. So when the time for broad-cast sowing arrived, (and otherwise the earliest safe time for seeding,) his general and former labors of seeding would be lessened by as much space as he had already drilled. His entire seeding would be so much the sooner completed, and the more likely to be all performed in good conditions of soil and weather. This earlier finishing, if by five days, will afford that much time (then or later,) for running cultivators, or ploughs, over the drilled peas, and giving the slight hand-hoeing or weeding necessary to destroy the first weeds. If nothing more should be done, the crop will be much cleaner and better than of the later-sown broad-cast peas. And a second and later and shallow ploughing, would be all that would be desired for the best production. There would be, indeed, considerably more cost of tillage. But, in compensation, there would be a saving of seed, a clean and full crop of peas, and the pods so much more abundant and perfect, that twice as many seeds could be gathered as is usual or practicable from broad-cast vines. This is the testimony of the largest pea-farmers of North Carolina, who raise, and gather by hand, nearly all the peas that are sold in our markets.

There is another aspect of this subject which deserves notice. Drill culture, to whatever extent it may be convenient to be adopted on any farm, will always be early seeding, and induce earlier maturity of the pea-crop. Thus, if serving to advance the maturity of the latter portion of the general sowing, by ten days, it may double the manuring value of the products of that latter portion of the crop. For unless the seeds are fully grown, I believe that

the best manuring value of the pea-plant has not been formed. I would expect but little of manuring benefit from a cover of peas ploughed under before any pods were grown—or (as some closet-farmers earnestly enjoin as essential,) when the plants are just in blossom. In our Piedmont region, the trials of the pea-fallow have been, as generally found, or supposed to be, of no benefit, as they have been certainly beneficial in the tide-water region. I do not dispute these alleged facts of failure, sundry of which are of the experiments of farmers whom I know well, and than whom there can be no better authority. Neither can I pretend to account for this want of benefit so different from all experienced and reported elsewhere. But this is certain: the best growing (or hot) season, is too short, even in lower Virginia, for the best production of the pea-crop—and still less favorable is the climate as the mountains are approached. I thence infer, that in most cases of trial in the higher country, the pods and seeds were not enough advanced in growth to have reached their mature and important value as manure. This may not be the only reason for the comparative inefficacy of the pea-crop in the upper country. But so far as the late maturing is an obstacle to profitable production there, the drilling would go far to remove that objection. If, by this means, the time of seeding could be safely advanced ten days, and thereby as much the time of maturing, the profitable production of the crop may be extended one hundred miles farther North and West, beyond the previous limits of broad-cast culture.

In this and the preceding year, the broad-cast pea-crops have been very unproductive in grain. Broad-cast culture has been greatly extending in late years, and consequently the demand for seed has been greater than the supply. Peas which formerly were sometimes as low as 40 cents the bushel, were, last spring, as high priced as $1 40 to $1 50. If every farmer, who sows peas, would drill but one-tenth part, (and that of the poorest part) of his field, he would not fail to obtain a plenty of seed, and could gather them at half the labor otherwise to be incurred—or for one-third of the cost of buying them, at recent prices. As long as broad-cast sowing is the general course, the price of peas must continue high—and that will render the crop of grain (or seed) profitable, not only for home use, but for market, for all drill culturists, who are favorably situated as to soil and climate.

It is proper to add, that while I have had abundant experience of the stated disadvantages of broad-cast culture, when it was too early or very extensive, and the attendant failures of products, both of grain and vine, I did not try drill culture while I continued to be a practical farmer—and that I derive from information, and the experience and observation of others, all the facts above stated of the superior products of drill culture. The reasoning upon and deductions from these facts, for which I am responsible, the judicious reader may decide upon as well as the author.

EDMUND RUFFIN.

Marlbourne, Nov. 6th, 1857.

For the Southern Planter.

Breeding In and In, &c.

It has been said if you continue to raise from the same species, for a number of years together, your stock will degenerate, and will become useless.

I will now give my experience; and we will see, if by being particular in selecting the ancestors, the result is not the reverse of the above. My first experiment was at a hen-house, a mile from where I live; my stock of fowls then were the Black Mexican. I turned out six hens and a cock, from my first year's raising, and to all appearance they were as fine, trim made fowls as any I ever saw. The second year I found my chickens losing size; then I selected a tall spare-made cock, as being the finest chicken in the lot, and thought he would give them height; whilst the hens, which were low in stature, would give them size enough; but to my mortification the chickens became tall and slender, and in four years were not to be compared to the original stock. Now, at the same time I was trying an experiment where I live, in one of my lots, on the Earl of Derby fowls, and to my surprise they improved in form and some in weight.

I selected four pullets of good size and large bone; the cock I selected from chickens hatched in March—he was broad across the breast, back short and round, wings long and strong, feet small, legs large and straight, and in symmetry unsurpassed; then I gave him the run, and raised from him two years, though I turned out a cock the first year; and when I saw the chickens, the most of them wanting height, I selected the *hens*, not the *cock*, with long legs; and in that way I can keep a stock pure for any length of time without degenerating. My stock of Derbys' are finer to-day than they were when I got them.

Late chickens should never be turned out to raise from, unless you intend to cross them, for that will, of itself, make your chickens small. March chickens are preferred by me to any other month.

Now, how to raise them after you have them hatched: as soon as the chickens are strong enough to run, say one day old, take the hen and chickens and put them in a warm hovel, with some trash tobacco put on the ground; then feed them on dough and grease from the kitchen, &c.; the second or third day grease the hen well with lard and spirits turpentine under her wings, and her breast and head; after the chickens begin to feather grease them lightly; and after they are a month old give

them another greasing; and if you keep some assafœtida in the water they drink, it will, in a measure, free them from vermin.

You should never keep many chickens crowded in one hen-house, especially during August and September, for it will be sure to give them the distemper. The distemper is known by the chickens discharging a watery mucus from the nostrils, and the head looks pale, and the chicken has no appetite.

The first thing to be done is to grease them well; then mop the throat with spirits turpentine, and give them some meat of any kind, once or twice a day, for a week; then mop again, and by paying attention they will be relieved in ten or twelve days.

I am, respectfully,

J. McL. ANDERSON.

Caroline County, Va.

[*Communication to the Virginia State Agricultural Society.*]

Experiments in Feeding Farm Horses, and in Ascertaining the Yield of Flour from Wheat.

BY W. C. KNIGHT, OF NOTTOWAY.

[Premium Essay.]

Among the subjects suggested by the Executive Committee of the Virginia State Agricultural Society in their schedule of premiums for the present year (1857) are the following:

"5. *In Feeding Farm Horses*—the best and most economical mode of feeding farm horses; the cost to be stated."

"19. *The Yield of Flour from Wheat.*—For the best experiment to show what ought to be the proportion of flour yielded by a given quantity of wheat."

I propose to submit to the Committee on Experiments, my information on both of these subjects; but deem it proper to state that I have conducted no experiment with the view, at the time, of presenting the results for the premium offered by the Society. My knowledge on both has been derived from experiments made for my own personal satisfaction, and from practice and observation for a series of years.

1. As to the best and most economical plan of feeding farm horses.

Four years ago, being scarce of provender—having for a large portion of the year nothing but wheat-straw and corn-shucks, neither of which my horses would eat kindly in their ordinary state, I determined to use meal instead of the unground corn. The shucks and straw were cut up with a good straw-cutter and thoroughly dampened with salt-water, and after placing a sufficient quantity of provender in each horses' trough, a half-gallon of meal was sprinkled over it. When I say meal, I do not mean *fine meal*, such as is ground for bread, but *coarse meal*, such as the millers will take half toll for. I found, from close observation, that the coarse was preferable to fine. When the meal is too fine, it clogs the horses' mouth by adhering to the roof of it—causing annoyance and fretfulness whilst feeding; and for this cause some horses eat it unkindly, and others, after a time, refuse it altogether. In the *coarse* meal there is sufficient dust which adheres to the wetted provender to make that palatable, and the coarser parts are masticated, and for this reason preferred by the horse, which, by nature, is a granivorous animal; and it appears that grain, to have its best effect, must, to some extent, be masticated. In feeding with meal, it should never be mixed with the cut-stuff before it is put into the feed troughs. Each horse's allowance should be spread over his feed in the manger; and in this way there is no loss, and the animal gets his due quantity. This experiment in feeding with straw and shucks for an entire year was so satisfactory, both as regards the condition of my horses and economy in grain, that I determined to continue it. There was a saving of at least one third of the grain required when fed in the ear. This fact was easily ascertainable, because the grain was ground at my own mill, where there was a record kept for every customer; so that the quantity of corn consumed by my horses was known to the bushel. I have continued this method of feeding, (wheat and oat-straw, and corn shucks with meal,) for four years, and my teams have always been in excellent condition, notwithstanding there has been scarcely a day, (Sundays excepted,) when they have not been in the plough or wagon. I have found too that a meal made of *one measure* of corn and two of clean oats results in a still further saving of grain, and greatly cheapens the cost of feeding. It has, consequently, been my practice never to feed oats in the sheaf, but to thresh out the grain and use the straw as cut-stuff. The quantity of meal from these mixed grains, which I have found sufficient to keep a horse in good condition under hard work, is *two gallons a day*, to be given as follows: half a gallon at the morning and mid-day feeding, and one gallon at night. The cost, therefore, of the grain for one horse per day, (putting corn at one dollar the bushel, and oats at fifty cents,) sixteen and two-third cents. The saving as compared with the usual mode of feeding corn in the ear, can now readily be seen. I believe it is generally conceded that a horse cannot perform hard work with less than ten ears at a feed, which makes 30 ears per day. Taking 110 ears to the bushel, we have the day's feed equal to 3-66 parts of a bushel, which is equivalent to 28 cents; thus making a saving of 11⅓ cents per day, or $41 36 per each horse per year. These figures may be relied on as correct. The quantity of grain consumed is a matter of record in my mill-book, and the

method of feeding has been pursued for four years, and during this time I may put down *in round numbers* the average amount of grain consumed by each horse at 5 barrels of corn, and 50 bushels of oats, and the annual cost at $40. The whole result, then, of these experiments, and my corroborating experience is, that by grinding corn alone and using it with the cut-stuff in the manner designated, there is a saving in grain of 33⅓ per cent; and by making a meal of corn and oats together, there is a saving in cost of 50 per cent. in grain.

2. *As to the Yield of Flour from Wheat.*—On this subject I think I can furnish reliable information. At the Nottoway Mills, the property of myself and neighbor, W. P. Dickinson, Esq., it has been the rule to keep a tabular statement of the wheat received from every customer, and to note in separate columns the yield from each parcel in all grades of flour, also of bran and other offal. From this record, so kept for the years '55 and '56, I have made an estimate of the average yield, which is as follows:

Family Flour	51	per cent.	weight of	Wheat.
Superfine "	18	"	"	"
Middling and Fine "	3½	"	"	"
Shorts "	1½	"	"	"
Ship-stuff "	3½	"	"	"
Bran "	16½	"	"	"
Loss in screaning and dust in grinding	6	"	"	"
	100			

These papers are respectfully submitted to the Committee on Experiments.

I do not so much desire that a premium shall be awarded as to furnish the Society with such information as I possess on two matters of great practical importance. W. C. KNIGHT.

INWOOD, Nottoway Co., Oct. 16th, 1857.

For the Southern Planter.

The Cold-House Grapery.

This is an improvement in modern horticulture, which. if known in Virginia, has been confined to a very limited extent in practice. The merchant princes of New England, in imitation of the nobility of Great Britain—25 or 30 years ago—had glass structures to raise grapes and tropical fruits, by the means of artificial heat, and produced grapes as fine as any in the work. By hastening their maturity, they widened the season for this luxury several months—even to six months in the year—instead of two or three, the ordinary length of the natural season, in the most favored grape growing countries.

But this forced state of things, called the *Hot-House* grapery, in contradistinction to the Cold-House grapery, is only attainable by an expensive apparatus to generate steam or heat, and circulate it by a complicated system of metalic pipes through the apartments of a crystal palace, within which the temperature must be regulated by the Thermometer, requiring the skill and vigilence of a scientific agent night and day for months in succession, to regulate with accuracy the artificial climate, necessary to success. Of course, such an expensive luxury, can only be indulged in by the very rich.

But the triumphant genius and commonsense tact of our Yankee brethren, has converted this unattainable regal luxury into a cheap and simple improvement, within the reach of every one, who can afford to encounter the cost of a four horse wagon and gear—for a cold-house grapery can be erected for less than the cost of that article, of sufficient capacity to afford 5 or 600 lbs. of grapes in the utmost perfection—and, if the matter is to be judged of by dollars and cents, worth at the lowest estimate 50 cts. per lb., and in the neighbourhood of any market would thus more than indemnify the outlay yearly, besides supplying the family with an abundance of the best fruit in the world.

The first step in the construction of the cold-house grapery, is to dig a pit three feet deep—gently sloping in the bottom from the side where the wall is to be raised, upon which the roof is to rest—the best position for the wall is the north or north-western side of the pit. The pit being dug to the required depth, and the bottom formed to the proper declining grade, say at least 8 or 9 inches to 30 feet, it must then be filled to the depth of six inches with broken stone, brick bats, and if to be had, a large mixture of oyster shell, or any old lime rubbish—the remaining thirty inches of the pit to be filled wtih the following compost of soils and manures: ⅓ alluvious sandy soil, (the more sandy the better,) ⅓ well rotted stable, or cow house, or hog pen manure, and ⅓ common soil of best quality—and while mixing these thoroughly together, add 5 bushels of lime, 5 bushels of bone dust, 5 bushels of drift ashes, 1 bushel of salt, and 1 bushel of peruvian guano, to every one hundred cubic yards of the above compost, incorporating it carefully with the mass for the pit, or bed in which the vines are to be planted.

The wall of stone, brick, or cobble, must rise 15 feet above the surface of the bed of soil when filled up to the prescribed level—covered with a wall-plate to sustain the rafters, upon which the glazed sashes rest, which form the roof—the rafters to be placed every three feet upon the wall-plate—the roof projecting from the top of the wall at an angle of forty-five degrees with the wall, over the pit, or bed of soil, and the rafters being about 15 feet in the clear, at the above angle, will cover a border next to the wall about ten feet wide—here

a line of upright or perpendicular sashes, filling the space from a light sill sunk a little within the surface of the prepared soil, and extending up to a light plate supported by studs corresponding to each rafter, meets the inclining roof composed of glazed sash work, filling the space between the rafters, and having its drip just clear of the light plate, completes the glass work of the cold-house grapery. But for the protection of the vines and fruit, between it and the wall, the gable ends must be closed. This will be best and most economically done, with the same material of the main wall, with a tight door in one or both ends if desired.

The extent of the pit, beyond the space covered by the glass, must be double, at least, to that within the glass—the vines are to be planted just within the sill which holds the upright or perpendicular sashes—and one wire to each rafter only—and being placed as directed, may shoot their roots freely into the warm bed under the protection of the glass or the more extensive one without—with the further advantage from this position of each vine, that it may be more conveniently trained back to its own rafter.

The upright sashes between the sill and light plate, for the convenience of ventilation, are hung upon central pivots, so as to be thrown open or closed at pleasure; and so likewise the upper tier of sashes on the roof, for the same object of ventilation, are made moveable; but in this case they are let down or drawn up by sash cords and pulleys, which are worked within the house.

With these simple arrangements and a moderate share of attention, to guard against the fluctuations of our climate, with proper watering and ventilation, all of which a little experience will soon teach—all the advantages of a hot-house grapery may be secured, save the single one of ripening the fruit a few weeks earlier.

A cold-house of half a dozen rafters will more than supply the largest family. I saw one of 16 rafters this summer in Providence, R. I., loaded with fruit, estimated at six hundred pounds, worth in that market from 80 cts. to a dollar.

Note.—Glass covering may be put down at 90 cts. to a dollar the superficial foot.

Deeming the foregoing worth public notice, if you agree with me I hope you will give it a place in the Southern Planter.

Yours, Respectfully,

John H. Cocke.

Frank G. Ruffin, Esq.,
Ed. So. Planter.

Carrot Pie.—Wash and scrape the carrots, boil till soft, sift and prepare like pumpkin pies; many think them superior to pumpkins. They may be made with or without eggs.—E. E.

For the Southern Planter.

Multum in Parvo.

My sons I send you this greeting.

Write whilst you are resting.

A man who stays at home and labors diligently will make a clear profit of about one-tenth of his labor; but a lazy man, or gad-about will be half-starved about half his time.

"He who does not provide for his household, has denied the faith, and is worse than an infidel." You see from this what a curse there is on the lazy man.

He who during the day has done more than he expected is a hero; he who has done less, is a lazy dog.

Cabbage is an excellent food for cows.

Cabbage and asparagus are properly marine plants, therefore should be fed plentifully with water and salt.

Shun law, a gun, and a fishing hook.

Let no lick be lost, but always strike in the right place. Suppose A makes all his licks perfect, and B makes a misslick every tenth strike. Suppose it takes 100,000 licks to make a support; you will see that B must make 110,000 licks to obtain his bread, whilst A with the same number of licks has made a clear profit of ten per cent. on his labor.

Obtain the best tools, and keep them in good order. Don't be beating out your lives by hard licks, with sorry or dull tools.

If you sow oats on rich land, and intend to feed the straw, sow five or six bushels to the acre; the straw will then be of fine quality.

Orchard grass and clover, and evergreen and clover ripen together, therefore should be sowed together. I doubt the propriety of sowing clover alone for any purpose whatever.

Lean your fences up hill, so that if they fall, they fall upward.

Did you ever know a negro or other ignoramus to set a stake perpendicular on a hill-side.

Remember that any thing which is worth doing, is worth doing well.

There is much difference between manure and stimulant. A stimulant is, properly speaking, matter applied directly to a crop. A manuring is, properly speaking, the application of matter directly to land not in cultivation. It is a question of mature consideration, whether it is best to manure or stimulate.

If land which will produce twenty bushels of corn to the acre is worth ten dollars, what is that land worth which will produce forty bushels to the acre? I am really in earnest when I request one of my sons to answer this question; but take care I do not pronounce your cyphering wrong. OLD MAN.

For the Southern Planter.

Log Fence.

Large and Round Logs.

To make a log fence on level ground, cut a

small trench in the earth, in which lay your foundation logs, the ends touching. Cut notches in these logs, in which place blocks of wood about two feet long. On these blocks cut other notches, in which lay other logs; and if your logs are large your fence is complete; but if not, add other blocks and logs. The larger the logs the better, and two should suffice, otherwise the fence is more liable to tumble.

To run a log fence around a hill or mountain side, place your foundation as above directed; then instead of the blocks, place small logs from six to ten feet long, on which put other logs until your fence is complete.

A fence of logs running up hill (perpendicular) cannot be made to stand.

Place your blocks or cross logs from two to four feet from the ends of the logs immediately above, so that gravity may be equalized.

No matter how knotty, crooked, or twisting the logs, and no matter as to length, all can be made to answer the purpose.

No pig can pass a well made log fence, no cow or horse can push it down, no wind can blow it over, no fire can burn it when made of chesnut; it will last from fifty to one hundred years; and lastly, where timber is convenient it is the cheapest fence which can be made.

ZA. DRUMMOND.

November, 1857.

For the Southern Planter.

To Clear Steep Land.

By standing on the lower side of the trees they may be handily cut near the ground, on the upper side. Begin to clear on the lower side. When a tree is felled, cut off the limbs, and it will roll to the bottom. Much of the brush will also be tumbled into the general pile by the logs. In this way at least five times as much clearing can be done as in the usual mode.

ZA. DRUMMOND.

November, 1857.

N. B.—If you have any business below, send a lazy man about it, and if he gets killed by a log, not much difference. Z. D.

From the Richmond Whig.

The Past and the Present.

THE CONDITION OF THE COUNTRY IN 1857—WHAT OF THE FUTURE?

It is difficult to realize the terrible financial pressure that has been experienced, with all its consequent embarrassments, and with the nation at large in possession of such immense wealth. It is at least certain, that we are infinitely better off than in 1837, and that a decided improvement may be anticipated in the course of a very short time comparatively speaking. It is quite possible, nay, it is true, that we have imported too much, and that we have lived too fast. But it is equally certain, that we possess many of the most substantial elements of wealth and prosperity, and that the panic aside, we have experienced nothing in the way of a national calamity. What then, are the facts, as relates to the two periods? According to the *Cincinnati Gazette*, the commercial crisis of 1837, was attended by the following marked and leading features:—

1st. By the reduction of the tariff of 1832.

2d. By the great and rapid extension of foreign commerce.

3d. By the great and rapid extension of Bank Discounts, attendant upon the extension of commerce.

4th. By great and general land speculations.

5th. By the heavy drain of gold to meet the demand from Europe, and the payment for lands.

6th. By the rapid curtailment of Bank Discounts to meet the demand for coin.

7th. The general suspension of Banks, in consequence of their inability to meet that demand.

8th. By the failure of the States of Indiana, Illinois, Michigan, Mississippi, Arkansas, and Florida, to meet their obligations.

9th. By the efforts of State Legislatures, through Relief laws, and other temporary devices, to remedy the general disorders of finances and the embarrassment of debtors.

10th. The banks of New York resumed specie payments in 1838, and all the banks in January, 1839.

11th. In September, 1839, all the banks South and West of the Delaware suspended a second time.

12th. In February, 1841, the Pennsylvania Bank of the United States failed, and the banks of Philadelphia and Baltimore suspended again.

And according to the Washington *Union*, our position at the present time is as follows:—

The balance of trade is in our favor. England is in our debt. It is immaterial to the question that some of her capitalists have chosen, from time to time, to invest large sums of money in our railroad companies. Their biting misfortunes with the stocks of Mississippi years ago projected them heedlessly upon corporations. If they had put their money in State stocks, it would have been safe. All that is thus vested will be found to be so. The interest which those loans will draw from the country will be comparatively small. But the actual indebtedness of England will be more than a counterbalance for any drain which may be made by her citizens for interest upon loans. We at this moment stand fair and equal with all nations, and have nothing to oppress or even to annoy us from abroad. What, then, is our condition in regard to our home resources? We shall simply speak in round numbers, but within the minimum of the true figures.

Our cotton crop of last year was one hundred and thirty millions. It will be now worth one hundred and sixty.

Our tobacco crop this year will produce twenty millions of dollars. There are twenty one States in this Union which grow tobacco, and the crop of this year is an average one.

Our wheat crop in 1850 was one hundred millions of bushels, and estimated that year at an equal amount of dollars. Since then a very great stimulous has been applied to wheat-growing. Then we had only eleven millions of acres in wheat. Now we have not less than twenty-five. It is seven years since then, which is an item to cause increase, and must be added to that of years, and the greater demand now than then. The product of wheat, we have no doubt, will be two hundred and twenty-five millions of bushels. It may be rated at an equal sum in dollars.

California will produce forty-five millions of gold. This will not leave us as heretofore. Then four fifths of it went away. This year four-fifths of it will remain.

Our crop of corn in 1850 was estimated at two hundred and sixty-six millions of dollars. This year we shall have eight hundred millions of bushels. It will be worth more than the sum of that year.

Besides these staple articles, we have a long list of exports, which would swell the aggregate amount to an immense number of millions.

The contrast, the reader will perceive, is at once striking and encouraging. Surely, then, we may indulge a hope, and with reason, that the existing troubles will prove but temporary, that light will soon dawn, and that the excitement, the anxiety and the panic will speedily pass away. They have, we admit, lasted much longer than we at first supposed, but the crisis is over, and the revival, however slow, cannot but be sure.

Mechanical Value of Bones.

THE utility of the present age is fast proving the triteness of that ancient ism, "nothing is lost." As proportions of our sphere of natural phenomena enlarge, how many substances heretofore considered valueless become suddenly imbued with new being, and spring up into articles of beauty and usefulness. Pre-eminent among these stands the bone.

Among the earlier uses to which refuse bone was put, was the formation of the exposed portions of destructive weapons.—Arrows, clubs, spears, and all the paraphernalia of savage warfare, received in the finishing process the casing and ornamenting of bone. The spinous bone in the back, fins and tails of various fishes, and the serrated teeth of sharks, furnish examples of the manner in which rude nations avail themselves for the fabricationof offensive material.

The male economists of the culinary department would fain prove that the removal of the meat from the joint in which the bone forms the nucleus, was but the *first step* in gastronomic science. They tell us that compounds as delicate and nutritious can be charmed as readily from that seemingly worthless ossification as from the best joint that ever graced the larder of the gourmand. Soups and jellies have been obtained from bones by subjecting them to powerful heat, not only dissolving the gelatine or fatty matter of which they are in part composed, but the bones themselves. The fact that they contain this ingredient, and the ease with which it is extracted when the bone is powdered or scraped, has led to the employment of the merest shavings resulting from the product of manufactured articles. These scrapings, shavings and sawdust are used by the pastry cooks of Paris in the preparation of jelly. This can be obtained equal to the best "calfsfoot," and has, as argument in favor of its use, the ease with which it can be kept—no deterioration of quality being perceptible through age.—So long, however, as nations maintain a tolerable degree of prosperity, we do think that the great advantages claimed for the systems of PAPIN, BOYLE and D'ARCET will be recognized by the general adoption of their schemes.

Bone is used as a substitute for wood and stone, being harder than the first and less brittle than the latter. For ornamental purposes the finer kinds, such as the teeth of the narwahl, walrus, tusks of the elephant and hippopotamus, have been employed to almost an unlimited extent.

By combustion of bones in close vessels chemical products are obtained. Ammonia results from the hydrogen and nitrogen contained. When the other gaseous elements are evolved the residue is known as animal charcoal—that from bone taking the name of "bone black"—from ivory, "ivory black." The latter is a pigment, and is used by artists for coloring; the former is an ingredient in the material used for clarifying sugar. The ash—when everything else is extracted—has also its purposes of utility. Ground to powder, cupels, for assaying, are constructed from it; when

washed and cleaned a polishing powder of great excellence is the result.

Thus we may perceive how much may be wrought apparently from nothing—that simplicity is not the synonym of worthlessness nor complexity, but another word for value.—*Moore's Rural New Yorker.*

Fattening Animals.

There are certain principles which apply to the feeding of all animals which we will shortly notice.

1. The *breed* is of great importance. A well bred animal not only affords less waste, but has the meat in the right places, the fibre is tender and juicy, and the fat is put on just where it is wanted. Compare the hind leg of a full-blood Durham ox, and a common one. The bone at the base of the tail extends much further in the former, affording more room for flesh, and the thigh swells out of convex or circular shape; while in the common ox it falls in, dishing and hallow. Now the "round" is the most valuable cut, and is only found in perfection in high-bred stock. The same is the case over the whole body. So well do eastern butchers understand this, that their prices are regulated by the breed, even where two animals are equally fat. They know that in a Durham or Hereford ox, not only will there be less offal in proportion to weight, the greatest quantity of meat will be where it brings the highest price when retailed, and will be of a richer flavor, and more tender fibre. The same is the case with hogs. A large hog may chance to make more meat on a given quantity of food than a small one, but the meat of the first will be coarse and tasteless compared with the other; and in the east, flavor and tenderness greatly regulate prices. Consequently, moderate sized, short-legged, small-headed hogs, always, in the long run, beat large breeds out of favor. In preparing for a market, "fashion and taste" must be as much considered by the farmer as by the tailor. This one fact is at present revolutionizing the English breed of sheep. The aristocracy always paid high for small Welch and Scotch mutton; but the great consumers, the mechanics, preferred large fat joints. The taste is now changed. In Manchester and other such cities, these large joints have become unsaleable; and all the efforts of the breeder are now turned towards small breeds maturing early, with comparatively little fat. According to late writers, the large Leicester and Cotswold are going quite out of fashion. When we give $3,000 for a Durham bull, it is not that his progeny are "intrinsically" more valuable to that amount, but the increased value and the fashion together, make up the difference. And it is thus, that while Durhams and Herefords are preferred for ships and packing, Devons are high in repute for private families. The joints are smaller, but the meat has a peculiar richness, probably found in no other kind of stock; and the proportionate waste is said to be less than in any other breed. Thus in the London market, the Scotch Kyloes, and then the Devons, (the former even smaller than the latter,) bring the highest price because preferred by the aristocracy. So in Dublin, spayed heifers are sought for. But the breed also regulates the profit. There is nothing more certain than that one kind of animal will fatten to a given point on much less food than another, and as fattening our stock is only another mode of selling our grain and grass, those animals are to be preferred which come to maturity soonest, and fatten on the least food. The difference in hogs is very great and important. While some breeds must be fed for two, or even three winters, others are full grown and fattened at ten months old; and the difference in profit is enormous. We cannot go into particulars, but the following rules may be considered as applying to all: An animal may be expected to fatten easily when it has fine soft elastic skin, with thin or silky hair; the head and legs short, the "barrel" large, but chest and lungs small; and when it is quiet, sleepy and easy in temper. An unquiet, restless, quick-tempered animal, is generally a bad feeder, and unprofitable.

2. Much depends in fattening on outward and mechanical management. Fat is *carbon*, or the coal which supplies the body with heat. If we are exposed to cold, it is burnt up in our lungs as fast as it is deposited by the blood; but if we are kept warm, by shelter or clothing, it is deposited throughout the body, as a supply on hand when needed. Warm stables and pens are a great assistance in fattening, and should never be neglected. So also quiet and peacefulness are important.

Every excited action consumes some part of the body which has to be supplied by the food, and detracts from the fat. In the climate of Michigan, warm stables, regular feeding at fixed hours, and kind treatment, with perfect cleanliness, save many a bushel of grain. Animals fed at irregular times are always uneasy and fretting.

3. Ground and cooked food fatten much more profitably than raw food. Mr. Ellsworth found that hogs made as much flesh on one pound of corn ground and boiled to mush, as two pounds raw unground corn; though the first did not fatten quite as rapidly, as they could not consume as much food in the twenty-four hours. By grinding and smoking, ten hogs will each gain 100 pounds in weight, on the same food that five would do if it were raw.

4. A change of food helps in fattening. Thus an ox fed entirely on corn and hay will not fatten as fast, or as well, as one which has root, pumpkins, ground oats or buckwheat, &c., fed to it at regular periods. The latter may contain intrinsically less nourishing matter than the corn, but the change produces some unknown effect on the stomach and system, that adds to the capability of depositing fat. The best feeders change the food very frequently, and find that they make a decided profit by so doing; Salt should be given with every meal to cattle—say an ounce a day. It preserves the appetite and prevents torpor of the liver to which all fattening animals are subject. This torpor, or disease, is to a certain extent conducive to fat; but carried too far the animal sinks under it.

5. In cattle the skin should be particularly attended to. A fat animal is in an unnatural state, and consequently easily subject to disease. Taking no exercise, it has not its usual power of throwing off poisons out of the system, and if the skin is foul, the whole labor is thrown on the kidneys. It is found by experience that oxen, regularly curried and cleaned daily, fatten better and faster than when left to themselves; and if the legs are pasted with dung, as is too often the case, it seriously injures the animal.

6. Too much rich food is injurious. The stomach can only assimilate a certain quantity at once. Thus an ox will prosper better on 30 lbs of corn and 30 lbs of cob ground together daily, than on 40 pounds of ground corn. These mixtures are also valuable and saving of cost for hogs when first put in the pen. If an animal loses its appetite, the food should at once be changed, and if possible roots, pumpkins, or steamed hay may be given.

7. Oxen will fatten better if the hay or stalks are cut for them, but care must be taken not to cut too short. An inch in length is about the right size for oxen, half or three quarters of an inch for horses.—*Farmer's Com. and Horticultural Gazette.*

Hot Beds—How Made.

Farmers like other people are fond of early vegetables. But it is too generally the case, that they neglect to raise them. People in the city will have the earliest to be obtained and willingly pay exorbitant prices for them.

Farmers could raise, even in the hot bed, the earliest vegetables, at very little cost. The hot bed requires attention early in the season, when their is but little other work on hand, and consequently could be attended to, about as well as not. We propose to inform our readers how they are made.

SELECTION OF GROUND.

The ground upon which a hot bed should be made, should have a southerly or southeasterly inclination. It should be fully exposed to the sun and out of the shade of trees, building, &c. A dry place is preferable—where water will not stand in pits one or two feet in depth, after a rain.

THE FRAME AND SASH.

The frame or box which supports the sash is generally about 4 1-2 or 5 feet wide and may be made of any desired length. The frames are generally made so as to be covered with from three to five sashes, each sash being commonly about 40 inches wide, and four and a half or five feet long. The frame may be made of inch plank—the side exposed to the north being 6 or 8 inches higher than the southerly side, so as to have proper slope to the sun.

The smallest sized glass should be used in the sash—certainly not larger than 7 by 9. The smaller the size the better, as a small pane of glass is not so liable to be

broken as a large one and can be more cheaply repaired. No cross bars are used in the sash—the panes of glass overlapping each other about a quarter of an inch, like the shingles of a house, and resting on bars that run lengthwise of each sash, just the right width for the panes to rest on two bars. The bars upon which the panes of glass rest should be an inch and a half or two inches wide.

PREPARATION OF THE BEDS.

It is a good plan to dig a pit from one to two feet deep where the bed is to be made, although this is not always done. Over this pit must be placed the frame. Now fill in half full with some fresh horse stable manure which has not been exposed to the rains, and which, within the last two weeks, has been turned over two or three times. If the manure is rather dry, water should be sprinkled upon it. The sashes of glass may now be placed upon the bed frame and the bed left for about 12 hours when air should be given it, and it should be closed again. In three or four days the soil may be put on this bed of manure. Fine garden mould should be used, and it should be spread to the depth of six or eight inches evenly over the bed. In one or two days the seed may be sown. If sown as soon as the soil is put on, the soil is said to burn so as to destroy the germ of the seed. Therefore air should be given to the bed once or twice before the seed is sown. After the seed is sown the bed should be sprinkled with water from the watering pot daily till the plants appear. Air should be given daily when the weather will permit so as to make the plants strong and hardy. The bed should be kept at the temperature of about 60°. The outside of the frame should be banked up with manure so as to keep the bed warm. In cold, freezing weather the beds will need to be protected by being covered with mats or straw.—*Valley Farmer.*

Wheat, although considered by some as a native of Sicily, originally came from the central table-land of Thibet, where it yet exists as a *grass*, with small, mealy seeds.

Rice was brought from South Africa, whence it was taken to India, and thence to Europe and America.

How much Corn, or Hay, is required to produce one pound of Meat.

Messrs. Editors.—What guide have we to form an estimate, or an opinion, as to how much meat may be produced by feeding certain kinds of food to animals? This question is one of much interest, and worthy of more attention than has been given it. With the present high price of meats, it is a matter of much interest to know how much meat may be produced by feeding a bushel of corn, or a ton of hay; and if either, or both of these be fed, what quantity, and what proportion of the one to the other, ought to be given to produce the best results. From the best information which the writer has been able to gather, it is assumed that, as a common measure of food for animals, Indian corn should be the standard, and that it possesses double the value of hay by weight—that, in nutritive value, one pound of corn meal is equal to two pounds of good hay—and that, with good stock in fair condition, eight pounds of corn, or its equivalent in other food, will produce one pound of beef, and that one-fourth less will produce one pound of pork, when the animals are fed under cover. It is obvious that the quantity of food required by an animal daily, depends on its weight, in a great measure; and it is found that one and a half per cent of the live weight of the animal, in corn, or its equivalent amount in other food, is necessary as food for working horses, working oxen, animals being fattened, or cows giving milk. A certain portion of hay, or other fodder, is necessary for an animal being fed with corn-meal; and a bullock weighing ten or twelve hundred pounds live weight, should not be fed more than three to five quarts, or six or ten pounds, of corn-meal daily, and the balance of his food should be made up with hay, or other green fodder. A larger proportion of corn or corn-meal than this, will not be fully digested or assimilated; for when a larger quantity of corn-meal is fed, a portion of it may be detected in the droppings of the animals.

By an experiment made on two lots of steers, each fed thirteen months wholly on hay, Boussingault found the one lot averaging 955 lbs. at first, at the end of thirteen months weighed 2,090 lbs. Increase, 1,135 lbs. They consumed, per head, 15,972 lbs. of hay; and one ton of hay produced 143 lbs. of increase of animals, or 14 lbs. of hay increased the weight of the animal one pound. The second lot, at the commencement of the experiment, averaged 896 lbs. each; at the end of thirteen months, the aggregate increase was 994 lbs. They consumed, per head, 14,554 lbs. of hay; and one ton of hay produced 137 lbs. of increase weight of animals. The second lot of steers were not allowed salt, which the first lot got. Thus the steers receiving salt increased 6 lbs. more on a ton of hay than those which were not allowed salt, and the coat and hair on the

steers having salt were much smoother and more shining than the coat of those not having had salt.

It will be found from these data that the steers consumed about 37 lbs. of hay per day, and gained daily about 2½ lbs. If, however, instead of being confined wholly to hay, they hod been allowed a suitable portion of hay, or corn fodder, with corn meal—say 8 lbs. corn-meal and 21 lbs. hay daily—it is probable that their gain would have shown a larger per cent. From the above data, as per first lot, we have to conclude that 14 lbs. hay, or 7 lbs. corn-meal, will produce one pound of beef. Therefore, if we assume the price of corn fifty-six cents per bushel, cr one cent per pound, and hay ten dollars per ton, or one-half cent per pound, the cost for feed in the production of beef would be seven and four-tenths cents per pound. Thus,

Feed for one day, 8 lbs. corn-meal, at one cent per pound,	8 cts.
Feed for one day, 21 lbs. hay, at one-half cent per pound,	10½
	18½ cts.

Cost of feed for one day, eighteen and one-half cents, and this producing 2½ lbs., would make the feed, per pound of meat, cost seven and four tenths cents. Are there not among your many readers, some practical farmers who have useful data or remarks to offer on this subject? S. G.

Lebanon, Pa. *Genesee Farmer.*

The Potato always Uncertain.

The potato was introduced into Ireland, and was becoming comparatively well known about the middle of the seventeenth century. Indeed, so early as 1629–30, when there was a dearth in England, according to a writer in the "Philosophical Transactions," "the potatoes were a relief to Ireland probably in their last famine; they yield meat and drink." But by whatsoever alias we call the root—whether, as in Virginia, "open awk," or in botanical jargon, "solanum tuberosom," or in Anglo-Irish of various periods, "potatee," "potado," "poratee," "pratea," "potata," or "phottie," the root has invariably been very precarious. In Scotland the adoption belongs almost to our own day. It may have baulke' the soldiers of Cromwell, because it was buried under ground, and they could not extirpate it so readily as they could have cut and carried growing corn. But if the potato was clever at deceiving the "proud invader," it has been quite as clever a traitor at deceiving the Irish themselves. So early as 1739–40, we hear of a great destruction of the potato by severe and long continued frost, after a wet summer and autumn. In 1741, the people were cautioned against eating potatoes, as they were believed to be d seased, and they produced disease in men. There were failures again in 1765, when potatoes were scarce and small, as they were in 1829; in 1770, when there was a "curl," the disease in the leaves; and in 1779, when Arthur Young found the people sprinkling their land with lime to prevent the "black rot." There is, indeed, reason to believe that the black rot was the same as we have witnessed in our own day. As time advances, the failure became more frequent. In 1784 the potato was called "spuggaun," from its diseased softness. There were failures again through excessive wet or excessive drought in 1795, and 1800, the curl; in 1801, freezing of the setts in the ground; 1807, frost; 1809, the curl; 1811, excessive wet; 1812, failure of the plants; 1816, the black rot; 1817, scarcity; 1820, inundations; 1821, rot, and souring in some places; 1825, scarcity and high price; 1829, excessive wet; 1833, potato failure, with famine and pestilence; 1832, epidemic in the potatoe; 1833, the curl, and probably the rot; 1834, a partial failure; 1835–6, a scarcity; 1838, general remarks on "inherent constitutional weakness," and deterioration; 1839, black rust. In 1839–42 there were failures also in the island of Arran and Scottish Highlands; a "dry gangrene" of the potato in Germany. After these dates we have, between 1841 and 1851, more or less of unfavourable seasons of every year, with partial or local failures, in the three subsequent years. The total failure and famine of 1846 is in the memory of everybody. This mere recital of dates is sufficient to show how impossible it is to depend upon the potato as the staple food of a nation. We are not, indeed, to suppose that the Irishman will instantly relinquish a root which is, in many respects, so immediately convenient; but a complete knowledge of its untrustworthy character will assist in removing it from the false position of being the staple upon which the whole body of the people is to

rely, and restore it to its proper place as an auxilliary among other vegetables for the table.

Interesting Chemical Discovery.

It is notorious that horses, more especially racers and hunters, are subject to inflammatory disease, and it is observed that grooms are short-lived. This has been ascribed to the air of unventilated stables being strongly impregnated with ammonia, an alkali that may be classed amongst the most powerful stimulants, the constant respiration of which predisposes to affections of the lungs. Various means have been tried with a view to the absorption of this subtle poison, but hitherto without attaining the desired result. During the last session of the Royal Agricultural Society of England, a paper was presented to the council by Mr. H. Reece, descriptive of a plan for purifying the air of stables, by a mixture of gypsum or sawdust with sulphuric acid. This mode is said to be at once safe, simple, and efficacious. Mr. Reece made some experiments in the extensive stable of Mr. Evans, of Enstone, the results of which are stated to be quite satisfactory. The stables were, in the first instance. strewn with gypsum (crystallized sulphate of lime) coarsely powdered; but though the ammonia was evolved with the wetted straw, no trace of it was visible after two days' exposure, when examined with slaked lime. The stables were then strewn with gypsum, moistened with sulphuric acid; and when examined next morning, every portion was found to have absorbed sufficient ammonia to emit its peculiar pungent odor when brought in contact with slaked lime. The stables had lost their close, unhealthy smell, and, to use the words of the groom, appeared to be quite sweetened. As it was evident the gypsum acted merely mechanically, affording a convenient absorbent surface for the acid, some further experiments were made, substituting sawdust for gypsum, which were attended with still more favourable results. The prepared mixture should be laid upon trays, as the acid is considered likely to injure the horses' feet. One part of sawdust will readily absorb three times its weight of acid solution, which should be mixed in the proportion by measure, of one part of sulphuric acid to fifteen of distilled water. The ammoniacal salt makes an excellent manure, but it should not be mixed with the straw until after removal from the stable.—*New England Farmer.*

From the Farmer and Planter.

Agricultural Department of the General Government---Strictures, &c.

Mr. Editor.—In the May No. of the Farmer and Planter you copy, approvingly, from the *Working Farmer*, remarks from Professor Mapes, urging the farmers to demand of the National Authorities, an "agricultural department of equal dignity with the other departments of the government." "We are the only nation," says he, "whose government is without a department devoted to agriculture. The farmers have a right to, and should claim, the appointment of a Secretary of Agriculture, bearing even rank with the Secretary of State, Secretary of the Treasury, &c., who should be a Cabinet officer, and whose department should be so organized as to render every new truth discovered in agriculture, the common property of all. We should no longer be put off with a clerk subordinate to a Bureau officer, and located in an obscure corner of the Patent Office."

I was aware that some portion (and I fear a large one) of the Northern people have such a purpose in view, because, petitions in favour of such an object, have been presented to Congress, from time to time, from that section; but I confess to a feeling of surprise and regret, to see the scheme endorsed by a Southern Agricultural Journal. I have often been amazed at the ignorance of constitutional limitation, manifested by even distinguished men of the North. The case before us is directly in point. I am unwilling to fan the fires of hatred and malevolence which already burns so fiercely in the two sections, and I therefore readily allowed that the Northern people are honest and conscientious, and would not wilfully violate their constitutional obligations except in so far as they are blinded by envy and passion on another question. It has puzzled me to account for this general ignorance in that section of our organic laws, but I have concluded that it originates in the fact that the North is the majority section, and can take care of their own interests, and hence they set little or no value upon the constitution. Indeed it does not protect, but restrains them from doing some things they would gladly do. Hence their indifference, not to say dislike, of this sacred instrument. Prof. Mapes I dare say never read the Constitution; certainly he never read it attentively with reference to this measure of an Agricultural Department; for, if so, he could not urge the Government to a

step which it has not the shadow of authority to take. Does he, or does he not know, that ours is a limited government,—limited to the express grants of power in the organic law, with incidental authority to do whatever is necessary to execute them. He will search the Constitution in vain for any grant of power, either direct or implied, to organize such a department, or even to justify a "clerk of agriculture in an obscure corner of the Patent Office," to which he sneeringly alludes. The 8th Section of the 1st Article of the Constitution, enumerates the powers of the Congress, and amongst them authorizes it "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." This is the unsubstantial foundation upon which the present Agricultural Clerkship is built, and is that, of course, upon which it is proposed to erect "an Agricultural Department of equal dignity with that of Secretary of State." In the name of our venerated fathers, I protest against so shameful a violation of the sacred compact under which we live as a nation. It has been a cherished fancy with me, that Providence mercifully concealed this continent from the knowledge of mankind, in order that, in these last ages, we might have a fair field on which to reconstruct society on a new and better basis. The chief ingredient in this better foundation is a *written Constitution*, clearly defining the powers of government and the rights of the people. Such a Constitution our fathers framed. Let it be disregarded, violated, and trampled under foot, and, I do not think it extravagant to say, that the last hope of man is swept away. Especially is it the interest of the South to see to it, that it is observed to the nicest punctilio; for it is the only panoply that has and will protect us from intolerable oppression, or revolution. As the minority section it is valuable—it is everything to us. Let us, therefore, not wink at the slightest violation of it, even for a good object. "From day to day the fatal precedent will plead." Aye! it is the fatal precedent of the Agricultural *Clerkship*, "in an obscure corner of the Patent Office," that now pleads for an "Agricultural Department of equal dignity with that of Secretary of State." But it would not be expedient if it was constitutional, to establish such a Department. Mankind have been governed to death in all the past ages. Governments have usurped the guardianship of the people, and assume to direct their pursuits and regulate their industry; whilst the latter, with their spirit and self-reliance crushed out, look imploringly up to their perfidious guardians. This, more than any other cause, has stayed the substantial progress of the world. The true office of government is, to protect us in our persons and property, and leave all else to individual or voluntary associated effort. The Patent Office Report, annually sent out by the government, is a valuable book; but is produced at a ruinous cost to the people of hundreds of thousands of dollars. The same work could be done better by private enterprise for a tithe of the money. The Agricultural Department, if organized, would add to the splendour of the over-shadowing central government at the expense of the people. It would be controlled by the majority section for their own special benefit, whilst we of the South would continue to *hew wood and draw water*. Nay, nay! I have only one prayer to offer to the Government, and that is, *protect me and let me alone*.

Respectfully yours, L. B. Mercer.

Recipe for Making Soap.

The following recipe for making soap is by a lady who took the Premiums for a very superior article at the late Fair of the Virginia State Agricultural Society. We think it will be found good:

Have ready hickory lye, strong enough to bear an egg, *showing the size of a dime* above the surface of the lye. To three pounds of clean fat, after being melted, add two gallons of the lye and a bit of lime the size of a walnut; boil it fast, and stir frequently. When it has boiled an hour stir in two gallons more of the lye; continue to stir it often, and always one way. After it has boiled for several hours, take out a spoonful and cool it on a plate; if it does not jelly add a very little water; if this cause it to jelly, add water to that in the kettle,—stir very quickly while the water is poured in, till you perceive that it ropes on the stick, or becomes heavy. When this is the case, you have what is called jelly soap, (or soft soap by some.) To make it hard, stir one quart of salt into the kettle, and let it boil ten minutes longer; set it by to cool. Next day cut the soap out of the kettle and clarify it by melting it over, adding water enough barely to cover it; let it just come to a boil, and set it away. When perfectly cool and firm, turn it out of the oven, scrape off any of the residuum that may adhere to the cake of soap, cut it in pieces and place it on boards to harden.

To make this soap fit for toilet purposes, it is only necessary to cut it into thin shavings, place it in a very nice tin-pan, add a little water, scarcely enough to cover the shavings; set it on some embers and stir and beat it with a nice spoon till it becomes a smooth jelly; while in this state, if you wish to colour it, dissolve *Chinese* Vermillion in a little water, and stir it in till you get the desired hue; take it off the fire, and add oil of lavender, bergamot, sassefras, or any other essential oil, the scent of which you like; and while it is somewhat liquid, pour it into moulds.

From the Farm Journal.

Dairy Management.

FEEDING COWS FOR BUTTER—NEW VIEWS.

BY J. S. HOUGHTON, M. D., PHILADELPHIA.

The true art of feeding animals, with a view to produce flesh, bone, fat, power of endurance in labor, speed of motion, or mere bulk and weight, is a very nice and complicated study, and requires for its exact elucidation not only an intimate knowledge of chemistry and physiology, but many and careful practical experiments.

The common and almost universal opinion among both scientific and practical men has been, that butter was to be expected from cows fed freely with substances containing starch or sugar, (starch in the process of fermentation or change being converted into sugar,) or with substances of carbonaceous or oily nature, as corn meal, linseed meal, and the like; for the reason that such substances aid the formation of fat in the animal organism, or prevent its removal even in cold weather, when once deposited. Hence potatoes, being composed largely of starch, sugar-corn fodder, molasses, Indian corn, linseed meal, malt, (barley in a state of change into sugar) have been relied upon in dairy management as the chief agent for the production of butter. These substances were not, of course, used alone, but in conjunction with hay, roots, corn, fodder, &c.

But a new and most important scientific and practical fact has recently been developed in England, in regard to the economy of the dairy, where butter is the main object, by the experiments of Dr. R. D. Thomson, lecturer on chemistry in the University of Glasgow, which were undertaken, it appears, by order of the British government to ascertain the relative butter-producing qualities of barley, malt, molasses, linseed meal and bean-meal, employed in various combinations, with the addition of good hay to furnish bulk of food for the stomach of the cow, as well as nutritive and fat forming elements.

In these experiments, which are very carefully conducted, bean-meal and hay produced more butter than any combination of the other articles of food above named. "These facts," says Dr. Thomson, "are not agreeable to the common opinion that the amount of butter afforded by a cow, is a test of the amount of oil contained in the food; and hence we are entitled to recommend oily food as preferable, for the production of butter, to food which experience teaches us will accomplish this object though less rich in oleaginous matter."

Bean-meal is set down by scientific men as chiefly a nitrogenous or flesh-forming food, closely allied in its nature to the egg, the oyster, lean mutton and beef in animal life, and to cabbage and the cereal grains in vegetable life.

Dr. Thomson explains the unexpected value of bean-meal, as a butter producing agent, by suggesting that it contains not alone the flesh-forming substances, but the "actual constituents or *milk* and *butter* in the proper proportions," especially when given with hay, which is similarly organized.

A moment's reflection will show that this remark is a sensible one. The cow, even when confined in the stable, (as was the case in the experiment above alluded to) being irritated by flies and other causes, exerts her muscular powers to some extent, and hence a waste of the nitrogenous part of the body, (lean flesh.) Again, in all milk there is casein or curd, (the cheese-forming substance, closely allied to animal flesh,) without which, of course, perfect milk containing butter, cannot be produced. Now, says Dr. Thomson, "bean-meal restores the waste of the animal system, in the cow, while producing milk, in the proper proportions," and hence the quantity of butter will not only be relatively greater, under the use of such food, but the cow will be kept in better general condition.

I will not here attempt to give the details of the experiments of Dr. Thomson. Those who wish to inform themselves fully upon the subject will find it useful to consult the entire report "On the Food of Animals," published by C. M. Saxton & Co., New York. I will only add, that the work is so strictly scientific, it will prove, probably, interesting only to those readers who are already familiar with the leading principles of physiological chemistry.

The scientific investigations of Dr. Thomson have received interesting con-

firmation, as to the soundness of the leading principle, from another series of experiments of a practical, though highly intelligent and somewhat scientific nature, made by a member of the Royal Agricultural Society in England, and now in course of publication in the Farm Journal. The first part of this report was inserted in the October number, and will be continued, I am informed, in the present number.

It will be seen from the report, that a mixed diet is recommended for dairy cows, where the object is to keep the cattle in the best possible condition, consisting of bean-straw, oat-straw, hay, wheat, bran, bean-meal, turnips, cabbage and rape-oil-cake. In the production of butter, the highest value is given to bean-meal and bean-straw, and rape-oil-cake, which last is similar to linseed-cake. The superior influence of the bean-meal and bean-straw, in contrast with linseed cake, is especially worthy of notice.

Now leaving every reader to study that report for himself, I come to the important practical deduction to be made from these new views in reference to feeding dairy cattle. The common idea is, that dairy stock can only be sustained on the richest grass-growing and grain producing land, and that poor, sandy soils, are unfit for dairy farms. Science and experience now tell us a different story.

Upon the theory and practice here advanced, common meadow hay or clover, corn fodder, bean-straw (bean vines,) rye bran (which last is oily,) turnips, carrots, parsnips, and if you please, a little Indian corn meal, would furnish food for dairy cattle capable of producing the greatest possible quantity of butter, and keeping the cows in the best possible condition as respects flesh and fat.

All the substances here presented, as food for dairy stock, can be grown upon sandy soils, such as we find in New Jersey, Delaware, Maryland, Virginia, &c. And upon worn-out farms, where there is usually some low land, or meadow, or even without the soil containing much vegetable matter, by the use of small quantities of artificial manure.

There are no soils so poor, (even the worst flowing sands of New Jersey,) that will not produce beans, or their equivalent, the cow pea, or field pea, now so much employed in the South as a renovator of exhausted soils. Beans or field peas can be produced on such soils in profitable abundance without manure, but still better by the aid of lime, plaster of Paris, guano or superphosphate of lime. The field pea, (which is in reality a bean) gathers much of its vegetable matter and probably nitrogen from the atmosphere, (especially when aided by plaster) and its various inorganic salts, (mineral substances) from the subsoil being a vigorous grower, and sending its roots far and wide and deep into the earth in search of food. It rarely suffers from long continued dry weather, and will remain green and healthy at a time when corn leaves are curled up as if burnt with fires. In ninety days it will make more fodder, per acre, than a first rate crop of clover of the second year's growth. Its grain, as will be seen from the experiment alluded to, is equal if not superior as food for dairy cattle to any oily food, and, of course, far cheaper than corn meal, rape, or linseed. It may be proper to state that I have tested the southern field pea in New Jersey, for three years, and speak of its qualities in this climate, from positive experience. It is said that on rich clay soils, it will make an excess of vine and will not mature its seed. It should be planted as early as Indian corn, sown broadcast for fodder, and in drills for seeds. Seed may be obtained from a broadcast crop. It requires about two bushel of seed per acre broadcast, less for drills.

If meadow hay cannot be obtained on a sandy soil, clover can, after turnips or field peas. Rye also grows profitably on sandy soils, especially after a green crop of peas turned under. Few soils are so poor as not to produce corn fodder, or they may be made to do so by the aid of a green crop, or a little guano, or nitrogenized super-phosphate of lime. Turnips, carrots and parsnips are readily produced, in immense abundance on sandy soils, by the use of super-phosphate of lime alone, or even ground bones. These root crops, indeed, with the field pea, form the basis of good dairy food for a sandy soil; and with their use, clover, timothy, herd grass, orchard grass, corn fodder will speedily be produced, if the manure of the cattle be carefully and properly saved and judi-

ciously applied. The red Indian corn and wheat even, may soon be produced, at a profit, by such management.

The bean straw, or vines, it will be observed, were steamed before being fed to the cows, in the experiments of the Royal Society; and much of the other food was also steamed or cooked. Dr. Thomson, it is presumed, fed the bean-meal in the raw state. Bean-straw is a harsh, dry food, unless steamed or soaked in hot water.

If the dairyman on sandy soil, had no pasture at first, it would follow, under the system of management here suggested, that he would be compelled to keep his cattle constantly in the stable, after the method called "soiling," feeding them in the Spring partly upon dry hay, and partly upon green oat or rye-straw, green corn fodder, &c., (or dry fodder if he had it,) until such times as pasture could be produced upon restored land. This, it is presumed, could not profitably be done, except near large cities, where milk and butter were easily marketed, and sold at retail prices: but in such instances it could be done with profit, if the soiled and liquid manure were all properly saved and mixed with muck or leaves, or only sprinkled freely with Plaster of Paris, as the rapid improvement of the land would pay the extra cost of stall feeding over the economy of pasturing with the loss of manure consequent upon the latter method of feeding. To say the least, the article here referred to, and the views which I have presented, afford many valuable suggestions to the dairyman, which he may improve to much advantage, whether located upon a sandy or barren soil, or upon one more favorable to the production of grasses and Indian corn.

I will take the liberty to add, that although I have had no practical experience in feeding cows, yet my knowledge of chemical and physiological principles, and my investigations into the subject of human food, long ago led me to believe that the only food in large proportions, was not so highly important in feeding milking-cows, as was generally supposed, and that a butter producing food of the best quality could be obtained from a sandy and worn-out soil with positive profit. In the Farm Journal for December, 1854, I published an article on the uses of the field pea, as food for milking-cows, in which I remarked in conclusion, as follows:

"I think pea-vines and corn fodder, served as cut food for milch cows, in winter, with a little corn and pea-meal, would furnish an admirable and highly economical food; and if to these articles, carrots and parsnips would be freely added, it would leave nothing to be desired by the milkman, or the maker of butter or cheese. The only thing I can think of, which it would be desirable to purchase occasionally, where butter was the object, is oil-cake if it could be cheaply obtained."

A Cheap Board Fence.

A CHEAP fence can be made in the following manner:—Take posts three by four inches, not set in the earth, but placed on stone; three feet from each post a hole is made in the ground, in which an oak stake four inches square at the top and eight high is firmly driven with a beetle; to this a board six inches wide is nailed, and thence to near the top of the post; another is nailed to the bottom of the post, and to the opposite side of the stake; the boards are then nailed on as is usual. This fence stands firm. Much good fence is removed and new built in its place, merely because the posts are rotting off, which might with a little labor be made to stand as firm as when first built.

E. S. BUCK.

Elba, N. Y., June, 1856.

The Japan Pea.

WE think this Pea has been much underrated, especially at the North, where the season is too short to grow it in perfection. Here it grows luxuriantly and matures perfectly, yielding an extraordinary return, when properly cultivated.—They should not be gathered until the pods begin to shrivel, when they may be carted to the barn or other out house, and threshed with the flail. They are very excellent for the table even when a year old, if prepared as follows:—Soak in water over night, and boil next day three or four hours; serve up with butter, or place them in the oven, with a few slices of bacon, until slightly browned, like baked beans.

On the Nutrition of Plants.

BY PROF. S. W. JOHNSON.

The experiments of Boussingault, detailed in a former communication, sufficiently demonstrates the importance of nitrogen in assimilable form, for the normal development of vegetation. We know that ammonia and nitrate are both available sources of nitrogen to the plant, and that if, in addition to one of them we supply the substance found in the ashes of plants, we have, with the water and carbonic acid of the atmosphere, all the food of vegetation.

Several years ago the writer furnished to the Country Gentleman an account of some researches by Ville, a Frenchman, which appear to prove that the free nitrogen of the atmosphere could be absorbed and assimilated by growing plants. Boussingault, however, has made numerous experiments with reference to this question, and his trials have invaribly failed to detect any assimilation of free nitrogen. But these experiments of Boussingault were made in a manner different from those of Ville, less liable indeed to certain sources of error; but the latter claimed that they failed to give results agreeing with his, because the plants were grown in unnatural conditions. During the past summer, however, the trials have been most carefully repeated in the Lawes' Testimonial Laboratory at Rothamstead, England, by my friend Dr. Evan Pugh of Lancaster, Pa., with a costly apparatus furnished by the liberality of Mr. Lawes; and though the experiments are not yet completed, Dr. Pugh writes me that they promise to confirm the view of Boussingault, viz., that *vegetation is incapable of growing at the expense of the free nitrogen of the atmosphere.* In due time Dr. Pugh's researches will be given to the public, and will doubtless settle this vexed question.

In this article it is proposed to review the question of the importance and functions of *the ingredients of the ash* of plants. It is generally admitted that these bodies are necessary to the perfection of vegetation; but doubtless our ideas on this subject have not that degree of definiteness which amount to a full appreciation, and which is needful in order to make them enter directly or advantageously into our actual theory of farming. I say theory of farming, for every man who is capable of thought *has* a theory of some sort or other, which guides his practice. I am of the opinion, too, that as soon as the farmers of our country possess tolerably accurate notions of the condition and prospects of agricultural science, they will be ardent in encouraging and supporting its further cultivation, and will be grateful to every one who assists in bringing these subjects before them.

Some have recently gone so far as to doubt whether the ash-ingredients of plants are essential, or are all of them essential; but the experiments that will be presently adduced leave no shadow of doubt as to their being indispensable constituents of vegetation.

This is a proper place to notice a confusion in the use of certain constantly employed terms, which has led to serious misunderstandings and long controversies.

The words *organic* and *inorganic* are what I allude to. In a general sense, the former is synonymous with vegetable and animal, used as adjectives; the latter with mineral. But it is customary to speak of animal and vegetable substances as containing an inorganic part. It is said that where we burn a vegetable or animal body, the *organic portion* disappears, while the *inorganic matter* is incombustible, and remains behind as ash.

Carbon, hydrogen, nitrogen and oxygen, are the ingredients of the combustible or organic portion, and hence have been called "the organic elements;" while the elements of earths, oxyds, alkalies and mineral acids, found in the ash have been classed together as "the inorganic elements." (Johnston.) Carrying out the same division, the mineral matters of soils and manures have been called the inorganic food of the plant, while carbonic acid, ammonia, nitric acid and water have borne the name of the organic food of plants. They are indeed the food which build up the organic part of plants, but themselves are inorganic substances. All the food of the plant is inorganic, said Liebig in opposition to the old philosophers, who maintained that organic matters (humus, geine, &c.,) were the pabulum of vegetation. Lawes and Gilbert, and almost all English students of Agricultural Chemistry accustomed to Johnson's definitions, therefore inferred that Liebig denied or ignored the value of ammonia, which they were accustomed to consider an organic body, and this is the origin of the unfounded idea that Liebig's "mineral theory" taught that if we supply plants with the ingredients of their ashes, they will flourish without other manure.

Now it is important to be able to distinguish from each other by some general term, the elements or substances out of which the plant organizes its organic part, and the others which are the ingredients of its ash. The most accurate and at the same time most important distinction, is this, that at ordinary temperatures the former exist as gases—are volatile; while the latter are solid—fixed. At high temperatures, too, the *compounds* of the former are destroyed, they themselves being volatized, while the compounds of the latter are fixed.

We may therefore designate carbonic acid, nitric acid, ammonia and water, as *the volatile food*, and potash, soda, lime, magnesia, oxyds of iron and manganese, sulphuric, phosphoric and silicic acids, as *the fixed food* of plants. The former are also very correctly termed the *atmospheric food*, while the latter are often spoken of as the *ash ingredients* of plants.

To resume our subject, not merely has the constant presence of the ash-ingredients, as revealed by analysis, demonstrated their indispensableness to the development of vegetation; but, latterly, a long and laborious series of synthetical trials has been carried out, which sets the subject in a stronger light, and whose continuance promises to reveal to some extent the special function of each ingredient of the fixed plant food.

It is to a noble German, Prince Salm Horstmar, that we are indebted for these beautiful and excessively laborious investigations, some of the results of which I shall lay before the readers of the Co. Gent.

It was necessary of course to grow the plants which were the subject of experiment, in a medium of itself, entirely free from ash ingredients. For the first trial, the *coal* of the purest crystalized sugar candy was employed. It was prepared with the utmost care, to avoid any contamination.

The pots were made of tin, had no opening at the bottom, and were coated interiorly with wax. The plants were watered with distilled water, and grew in an otherwise unoccupied room, into which the sun shone at mid-day.

Results of Experiments with White Oats.

1. The plant grown in the sugar-coal without any addition, was perfect in form and proportions, but of very diminutive size, and bore no blossoms. It derived its food from the seed and from the atmosphere.

2. The plant grown without addition of ash-ingredients, but with addition of nitrogenous food (nitrate of ammonia,) was disproportioned; its leaves were relatively longer, and had a deeper green color, and it developed one flower. The plants in both these trials were of equal weight.

3. In a soil composed of sugar-coal to which was added the following ash-ingredients in soluble form, viz., *silica, potash, lime, magnesia, phosphoric acid, sulphuric acid,** without any nitrogenous body, the oat plant *grows far better,*—attains four times greater weight—than when nitrogenous matters, but no ash-ingredients are added.

4. Plants grown with addition of certain ash-ingredients, and with nitrogenous matters, were very healthy and well developed. Those which received the same quantity of nitrogenous food but no ash-ingredients died in the first leaf.

When some of the ash-ingredients which, used together, produced healthy plants, were not supplied, the plants either perished in their early stages, or were small, pale, and irregularly developed.

5. Larger quantities of certain ash-ingredients added to the sugar-coal, the nitrogenous additions remaining the same, caused a thriftier growth and the development of more flowers.

From the preceding results, it is just to conclude that the oat plant requires for its normal and full growth, that the soil contain fixed bodies (ash-ingredients) which are an indispensable part of its nourishment.

It also appears, in accordance with the later results of Boussingault, that the oat-plant cannot thrive unless it receive supplies of nitrogenous food.

The Prince Salm Horstmar made numerous similar trials with barley, wheat, and rye, and all his results establish in the most conclusive manner, the absolute idispensableness of the ash-ingredients, and of all the ash-ingredients of these plants. In the continuation of this subject, will be given a few of his results regarding the effect of individual members of the group of bodies which we have classed together as ash-ingredients. It will be quite impossible to communicate all his conclusions, the condensed statement of which occupies 30 octavo pages, and are drawn from the observation of more than 150 carefully conducted experiments.

Before concluding, let me add a remark on one of the deductions drawn by Boussingault in his article, the translation of which is found on page 138, viz:—"That the supplies of assimilable nitrogen which the atmosphere is able to furnish, are too small to determine an abundant and rapid vegetable production in the absence of nitrogenous manures."

In Boussingault's experiments the plants were sheltered from all rains and dews; they were therefore deprived of what assimilable nitrogen, (nitric acid and ammonia) might thus be supplied to them, and consequently the conclusion, although highly probable, is not proved. Again, what is true of one plant may not be true of another. It is still possible that a slow growing pine, rooted in the sand of some mountain summit, may derive enough nitrogen from the air to determine what is for it an abundant development. We want, therefore, a new trial with the helianthus, grown in the soil of pure sand, mixed with clover ash, phosphate of lime, and bicarbonate of potash; but exposed to the dews and watered with rain water. And this kind of experiments ought to be extended with plants having other habits of growth—for Liebig raised excellent grapes in a barren gravel, using only the ashes of the vine as a fertilizer.—*Country Gentleman.*

MILLET, one species is a native of India, another Egypt and Abyssinia.

The Grasses are mostly native plants, and so are the Clovers, except Lucerne, which is a native of Sicily.

The Gourd is an Eastern plant.

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* These bodies existed in the following forms, viz., silicate of potash, carbonate of lime, carbonate of magnesia, phosphate of lime, sulphate of lime.

On Breeding Stock of any Kind.

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Prize Essay—Kentucky State Agricultural Society—First Exhibition.

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BY DR. R. J. BRECKINRIDGE, OF FAYETTE COUNTY, KY., TO WHOM WAS AWARDED THE SECOND PREMIUM.

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The particular stock to which the following remarks more immediately relate, is the *Shorthorns*, commonly called Durham cattle. But the great principles laid down apply to all kinds of domestic quadrupeds. The Shorthorns are selected, because they are at the head of all races of cattle; and therefore, in a country the basis of whose husbandry is grass, they are at the head of the live-stock interest. Anything which promotes their intelligent culture, must promote, in the highest degree, the agricultural interest of the State. The single point herein discussed is *breeding*—that being the only one embraced in this particular theme, as assigned by the State Agricultural Society. And the object aimed at is, to state, briefly and clearly, the great principles which breeders must understand and adopt, if they would breed with certainty, and with profit.

LAWS OF NATURE.

There are two natural laws which lie at the foundation of this whole subject, both of which we must steadily regard. The first is, that *like produces like.* What we expect and desire in offspring, we must find in the parents. This stability and uniformity of nature is the very foundation of the whole order of the universe. We are not entitled to expect that it will be departed from for our advantage, nor need we have any fear that we may not trust implicitly to its force. What we mean by *pure blood*, or *high bred*, is, that the animals thus designated belong to a family that carries very far, and that has carried very long, the power to produce other animals having the particular qualities we prize and seek. This great law of like after like is subject, like every other law of nature, to be weakened, or to be increased in its power, and is liable to operate to the great injury, or the great advantage of man. But its existence, and its fundamental importance, must be recognized in every step the breeder takes.

The second of the two great natural laws, alluded to above, may be thus stated: *Culture is capable of modifying the great law of like after like, both for good and for evil, to the utmost extent compatible with the enduring power of the law itself.* It is impossible to set limits to the injury, or to the improvement that everything which exists is capable of, while yet remaining essentially the same. While the first law teaches us that we can improve everything that exists. These two laws give to the breeder all the control that is possible, or desirable, over the subject. Absolute unity, certainty, and steadfastness in the thing, and yet almost boundless variety in the modes of its manifestation—these are the two grand truths which the breeder must operate with, in all his endeavors to perpetuate, or to improve any race of animals.

FUNDAMENTAL RESULTS OF THESE LAWS.

In the first place, it is utterly impossible for us to perpetuate *artificial* peculiarities of any kind whatever. A horse, nicked or foxed, never begets a nicked or foxed colt. In the second place, *natural* peculiarities—congenital, as they are called—when they are uniform in the particular race, will be propagated with like uniformity; thus, no Shorthorns is of any color but white, or red, or a mixture of both — In the third place, these natural peculiarities, even when they are personal to the particular animal, are, to a certain extent, propagated in its offspring; thus, a bull, born without a tail, or with a very coarse head, may be expected to have some calves with similar defects, and following up, we might at last establish a family thus accidentally originated by nature. In the fourth place, we may, by persevering neglect, or ignorance, or design, greatly seduce nature to originate these accidental varieties, and torture her into the production of deformed, or barren, or monstrous animals. In the fifth place, we may, by docile, assiduous, and kind waiting on nature, so learn her ways, and so win her smile, that our wise and experienced endeavors to help her efforts, will be followed by abundant rewards in the increased beauty, excellence, and value of all we rear. In the sixth place, our wisdom is, therefore, to avoid carefully all those pecu-

liarities which are merely *personal* to particular animals, and to select animals, for their general perfection in the peculiarities common to the race; for in the former case, we are liable to an excessive special development, while, in the latter case, we may expect general excellence and improvement, which is what we want.

GENERAL PRINCIPLES FOUNDED ON THESE LAWS AND RESULTS.

A vast amount of injury is done to domestic animals, of all sorts, by crossing various races of each kind upon one another. No man can guess of what race, or of what mixture of races, the common cattle, horses, sheep, or hogs of the country originally came; but every man can see how few capital animals are to be found amongst any of them. This promiscuous method of oreeding one variety upon another subverts the first law, and resists the uniform endeavor of nature, as applied to the whole subject of breeding. We cannot even keep up a race of half-breeds by breeding half-breeds to each other.—How, then, can a race, with a multitude of different crosses in it, possibly be either uniform or valuable? To adhere tenaciously to an unmixed blood, is the very first requisite in all breeding that aims to preserve the excellence we have already secured, or to increase it, in any race of animals.

2. The question of *pure blood*, as applied to every race of animals, has already been explained as a matter of principle. As a matter of fact, in the case of each particular animal, while we are left, in a great degree, to depend on the testimony of owners and traders for extended pedigrees, yet there are natural marks well known to experienced breeders, and clearly laid down in all books which treat of the different races of animals, which render gross imposition impossible on those who understand their business. A thorough-bred Shorthorn is as easily distinguished from other races of cattle as a Saxon sheep is from a Cotswold, or a race horse from a cart-horse; and unless we will put ourselves to the trouble of being qualified to do this, we must be content to trust our ignorance to chance.—With regard to herd books, we are liable to form very erroneous opinions. Those books are of great value, precisely as any other means of advertising is, and also very much as a record office of land titles is. But it is very idle to suppose that all advertisements are strictly true, or that all lands with a perfect title are rich lands. Many herd-book pedigrees are, on their face, condemnatory of the animals advertised, and not a few are incorrect. That breeders do not guard against such evils, or that they are not sufficiently informed to do so, are amongst the reasons why they are so often disappointed in the stock they breed.

3. It is one evil result of the various errors already alluded to, that any countenance should be given to attempts to elevate high grade cattle to something like an equality with those of pure blood.—Shorthorns are a distinct and very ancient variety of cattle: for our purpose in Kentucky, and in the West generally, incomparably the best race of cattle. High grades are, no doubt, a very great improvement on the common cattle; but to dignify with the name of full-blooded, and to allow them to be considered as a near approach to the pure-blooded, is a serious error, which can work nothing but injury to the stock of the country, and which can impose on none but ignorant breeders. If the Shorthorns were a race made by crossing several races—which some have ignorantly pretended—even then it would be useless for us to work the race over again by new crosses. But seeing it is a distinct, peculiar, and very perfect race, created, perhaps, at first, and very anciently, by natural congenital peculiarities in certain animals, and afterwards most carefully bred and improved by culture through many centuries, and now widely diffused and multiplied in all the finest portions of the earth, it is mere wantonness for those who are interested in this noble race to connive at practices so injurious to its reputation and value. If full-blooded means anything else than thorough bred, then it means grade, and ought to be so called; but if it means to place the grade on a level with the pure, then it is mere folly or imposture.

4. Thus separating the pure from the grade, produced by itself, and from all mixture with other races, no matter how excellent, we are restricted in breeding to animals of the one race, and this universally in all breeding that aims at per-

manent improvement. Pure breeding is, therefore, necessarily in-and-in breeding, to a certain extent. How far that principle should go, and by what means we can best avoid its supposed evil results, are questions upon which great difference of opinion exists. In this country there is a general prejudice against in-and-in breeding; and breeders of Shorthorns generally have accustomed themselves to keep their bulls only for a few years, and to seek breeding animals as remotely related to their own herds as they could obtain. It is this same feeling which has created and sustained such constant and excessive importations of Shorthorns from England; although, in the judgment of those most qualified to judge and who have had the best opportunities of forming an opinion, we have in Kentucky larger herds and better animals than exist in England. The most certain and the most obvious effect of this method of breeding is to deprive any particular herd of any distinct character peculiar to itself. The general improvement of all might possibly be promoted in this manner, if all breeders were skilful and experienced. But the special improvement of any, to a very high degree, is nearly impossible, under such a system, by which every breeder guarantees, in a manner, the skill and knowledge of all the rest, and at the same time deprives himself habitually of advantages obtained by his own skill or good fortune, at the very moment those advantages are most important.

5. As a matter of fact, experience has clearly proved, that while in-and-in breeding, followed ignorantly or indefinitely, may produce much injury, at the same time in-and-in breeding has been so followed as to produce not only the very finest animals, but the very finest herds of the race. As a matter of principle, as has been already intimated, in-and-in breeding is but another name for pure breeding; for all pure breeding is confining ourselves to one race, while in-and-in breeding is but confining ourselves to a few, or to a single family of that race. If we will be guided by nature, her proceedings are invariable as to the method by which she keeps races distinct, and carries them to perfection. For all animals that pair, pair out of the same litter from generation to generation; and amongst all gregarious animals, not only does the same herd continue itself, but it happens necessarily and continually, that the very closest in-and-in breeding, both up and down, and collateral, is the very rule of her work. In both instances, the results she produces is a uniformity and a perfection in every species, up to the highest points permitted by the circumstances of each. The general truth undoubtedly is, that by skilful in-and-in breeding, we intensify the prevailing blood, whatever that is; we get rid of all subordinate mixtures and tendencies; we give increased stability and uniformity to the peculiar characteristics of the race; and we establish, in the firmest manner possible, all the qualities of the race, whatever they may be. It cannot be too distinctly understood, that this question depends essentially upon another already spoken of. If the Shorthorns be a distinct and a pure race, in-and-in breeding is a certain way to perfect it; but if it be a made race, in-and-in breeding is a certain way to break up as mixtures, and to bring out the prevailing races which compose it. As there can be no doubt that it is a pure race, the popular prejudice against in-and-in breeding, as applied to it, is unfounded and injurious.

6. There is some difference of opinion as to the age at which animals should be put to breeding. The prevailing opinion among the best breeders is, that heifers should bring their first calf at about three years of age—some respect being had to the season of year at which the calf should come; and that bulls may be allowed to serve a few cows without injury to them, at fifteen or eighteen months old. The average time of gestation for a cow is two hundred and eighteen days.—Nearly all heifers will bring their first calf at two years of age, or even younger, if permitted, the effect of which is apt to be, to retard the complete development of the cow, if not to injure her permanently in size and appearance. Under all circumstances, this race of cattle appears to be liable to occasional barrenness in both sexes; and to compensate for it, by occasional excessive fecundity, twins being far more common than barren animals—both of which facts, if not peculiar to this race, are far more common than in any other. There is no reason to believe that the

offspring, either of the cow or the bull, depends upon the age of either parent for its excellence, except so far as the health of the parent, and its adequate vigor, may be considered as influenced by its time of life. As a race, the Shorthorns are vigorous, healthful, and long-lived. Among them, as amongst all creatures that exist, there is reason to believe that hereditary qualities, that are personal, descend most surely across the sexes, to wit: from the male parent to the female issue, and *vice versa.* A remarkable fact, of the very highest importance, of which all ages and conditions of men have had a vague conviction, which nothing but experience can establish, and which well deserve a more serious examination than it has received.

It would add many millions to the wealth of Kentucky, if all her cattle could be supplanted by this race of Shorthorns, or even by high grades of them. Even the permanent establishment of numerous herds of pure blood, and high excellence in her unequaled grass region would open a mine of wealth to the State. The culture of them, moreover, besides being amongst the most remunerative branches of rural economy, is one of the most rational and beautiful parts of the farm life of landholders. The great attention, therefore, which is paid to them, by all our Agricultural Societies, is one of their most beneficial acts; and this little attempt to promote their objects will be accepted, at least, as a token of the satisfaction and good wishes of an old breeder.

On the Exclusive Use of Guano.

From the very favourable results obtained from the use of guano and other portable manures, and the high price of grain at present, some gentlemen have adopted a system of farming which, however profitable it may be in the mean time, is sure to be attended ultimately with the deterioration of their soil. There are to be found in particular districts proprietors, who, ignorant of the details of farming, and unwilling to give that attentive oversight so necessary to its successful prosecution, have thought it better to keep no animals of any kind on their farms. White crops only are grown, the tillage of the land is done by contract, a liberal dose of guano is sown with the crop, and the whole is rouped off standing. For the last two years this has paid well. The practice has been followed principally in districts where there is a demand for straw, from the number of dairies established unconnected with any farms; and where the soil is unsuited for the growth of green crops, two white crops are raised with a liberal allowance of guano, and then the field is sown out with grass, which is let to the dairy-keepers or graziers. Of course such a system could only be pursued where there is a demand for the straw.

As guano and other portable manures have really some most extravagant admirers, whom no arguments will convince, we will not attempt the task of proving to them the injuriousness of the practice refered to above, but will simply direct their attention to the effects of the exclusive use of guano when continued for a time. We are told by M. Villeroy, in the Journal d'Agriculture Pratique, that there are farms in Saxony on which there are no animals, and on which the labour even is hired, and no manure but guano used. This has been continued for more than ten years; but it is found that they are now under the necessity of increasing the quantity of guano on those farms where it has been used exclusively. Where, for instance, they employed about 4 cwt. per acre, they are now obliged to apply about 4½ cwt. to produce the same results. He also mentions that there is an impression among the farmers in Saxony that guano is unsuitable for the growth of clover.

The above fact is deserving of all attention from farmers, particularly those who may pursue the system to which we have alluded before. It is also found here that much larger doses of guano are now required to produce results equal to those obtained when guano was first introduced into this country. This may no doubt arise from the guano now used being of inferior quality; but we do not think that there is such a difference in the quality as to cause such a disparity in the results. The true place of guano is as an auxiliary, not as a substitute for the ordinary manure of the farm. And it would be a pity if this, one of the principal aids to fertility, were to suffer at all in the estimation of farmers by its injurious use.—*Journal of Agriculture.*

Romaine's Steam Cultivator.

A trial of this machine took place on Friday the 11th ult., in a field near Crosskill's Agricultural Implement Works, Beverly. It differs from all others hitherto brought before the public for the purpose of applying steam power to the cultivation of the soil, in entirely dispensing with the use of plows, ropes, or auxiliary implements. It is a 14-horse portable steam-engine, capable of propelling itself, combined with, and giving motion to a rotary digger, which is said to pulverize the land completely to any required depth. The engine and boiler are constructed in a similar manner to the portable agricultural engines now in common use, and are carried by a pair of high, broad wheels, and two smaller wheels in front. The large wheels are driven round by the engine, and the front wheels used for steering; but by a simple disengaging arrangement, the latter are left perfectly free when the machine has to be turned round; and by driving one of the large wheels while the other remains stationary, the implement can be turned completely round in its own length. The cultivating part of the machine is carried by a strong frame attached to the boiler, and consists of a hollow cylinder six feet six inches long, and two feet six inches in diameter, armed with knives or cutters, on its outer surface. The cutters are of wrought iron, and sufficiently strong to enter the land, and encounter roots, stones, or other obstacles, without injury; but in case of accident, they can be readily replaced at small cost, and without delay, as each is secured separately by bolts, to the outside of the cylinder.

The machine is the invention of Mr. Robert Romaine, a Canadian, and was shown at Paris at the great exhibition of 1855. It there attracted the attention of Mr. Crosskill, who induced the inventor to bring it to Beverly, and during the last two years two machines have been constructed at the Beverly Iron Works, and experiments carried out for the purpose of fully developing the principles of the invention, and perfecting the details of the machinery.

The implement commenced operations at one end of a field of strong clay stubble, and traversed its entire length, transforming a breadth of 6½ feet into a perfect seed-bed, equal, it is said, to what could have been produced by twice plowing and harrowing, or clod-crushing. On its arrival at the headland, it turned round in less space than would have been required by two horses with a common plow, and returned along the side of the work already done. The cultivation of the field was thus proceeded with, no vacant space being left except the two small headlands, that could easily be finished by the machine after the rest of the ground was done.

The machine is said to be capable of cultivating from five to seven acres per day, at an expense (including engine-driver and assistant, coals, man with horse and cart to fetch water, and wear and tear of machine,) not exceeding 35s. to 40s. per day.—*Mark Lane Express.*

A Fowl Establishment.

The following is a description of an establishment belonging to a Frenchman near Paris. We do not know where the article first made its appearance, or to whom the credit of its translation is due. We give it as we find it, without assuming any responsibility as to its statements—our readers will take them at their own valuation, but may be interested in the story:

A Mons. de Sora has recently discovered the secret of making hens lay eggs every day in the year, by feeding them on horse flesh. The fact that hens do not lay eggs in winter as well as in summer, is well known, and the simple reason appears to be, that they do not get the supply of meat in winter which they readily obtain in the warm season by scratching the ground for worms and insects.

M. de Sora was aware of all these facts, and living at the time upon an old dilapidated estate, a few miles from Paris, the acres having been bequeathed to him a few years previously—he set himself earnestly at the task of constructing a hennery, which should be productive twelve months in the year. He soon ascertained that a certain quantity of raw mince meat given regularly, with other feed, produced the desired result, and commencing only with some three hundred female fowls, he found that they averaged, the first year, some twenty-five

dozen eggs each, in the three hundred and sixty-five days. The past season he has wintered thus far, about one hundred thousand, and a fair proportion of male birds, with a close approximation to the same results. During the spring, summer, and autumn, they have the range of the estate, but always under surveilance. In the winter their apartments are kept at an agreeable temperature; and, although they have mince meat rations the year round, yet the quantity is much increased in cold weather. They have free access to pure water, gravel, and sand, and their combs are always red. To supply this great consumption of meat, M. de Sora has availed himself of the constant supply of superanuated and damaged horses, which can always be gathered from the stables of Paris and the suburbs. These useless animals are taken to an *abbattoir*, owned by M. de Sora himself, and there neatly and scientifically slaughtered. The blood is saved, clean and unmixed with offal. It is sold for purposes of the arts, at a remunerative price. The skin goes to the tanner—the head, hoofs, shanks, &c., to the glue-maker and Prussian blue manufacturer; the larger bones form a cheap substitute for ivory with the button-maker, while the remainder of the osseous structure is manufactured into ivory black, or used in the shape of bone-dust for agricultural purposes. Even the marrow is preserved; and much of the fashionable and highly perfumed lip-salve and pomade, so much in vogue, was once closed within the leg bones of old horses. Uses are also found for the entrails—and in fact no portion of the beast is wasted.

The flesh is carefully dissected off the frame, of course, and being cut into suitable proportions, it is run through a series of revolving knives, the apparatus being similar to a sausage machine on an immense scale, and is delivered in a homogeneous mass of mince meat, slightly seasoned, into casks, which are instantly headed up and conveyed per railroad to the egg plantation of M. de Sora.

The consumption of horses for this purpose by M. de Sora, has been at the average rate of twenty-two per day, for the last twelve months, and so perfectly economical and extensive are all his arrangements, that he is enabled to make a profit on the cost of the animals by the sale of the extraneous substances enumerated above, thus furnishing to himself the mince meat for less than nothing delivered at his hennery.

It has been ascertained that a slight addition of salt and ground black pepper to the mass is beneficial to the fowls, yet M. de Sora does not depend upon these condiments alone to prevent fermentation and putrefaction, but has his store rooms so contrived as to keep at a temperature just removed from the freezing point through all months of the year, so that the mince meat never becomes sour or offensive; the fowls eat it with avidity; they are ever in good condition, and they lay an egg almost daily, in all weathers and in all seasons.

The sheds, offices, and other buildings are built around a quadrangle, enclosing about twenty acres, the court in the centre forming the general feeding ground. The latter is subdivided by fences of open paling, so that only a limited number of fowls are allowed together, and these are arranged in the different compartments according to age, no bird being allowed to exceed the duration of four years of life. At the end of the fourth year they are placed in the fattening coops for about three weeks, fed entirely on crushed grain, and sent alive to Paris.

As one item alone in this immense business, it may be mentioned that in the months of September, October, and November last, M. de Sora sent nearly one thousand dozen capons to the metropolis. He never allows a hen to set!

The breeding rooms are warmed by steam, and the heat is kept up with remarkable uniformity to that evolved by the female fowl during the process of incubation, which is known to mark higher on the thermometer than at any other periods. A series of shelves one above the other, form the nests, while blankets are spread over the eggs to exclude accidental light. The hatched chicks are removed to the nursery each morning, and fresh eggs are laid in to supply the place of empty shells. A constant succession of chickens are thus ensured, and moreover the feathers are always free from vermin. Indeed a lousy fowl is unknown upon the premises.

M. de Sora permits the males and females to mingle freely at all seasons, and

after a fair trial of the various breeds, has cleared his establishment of every Shanghai, Cochin-china, or other outlandish fowl, breeding only from old-fashioned barn-yard chanticleers, and the feminines of the same kind. He contends that the extra size of body and eggs pertaining to those foreign breeds, can only be produced and sustained by extra food, while for capon raising, the flesh is neither so delicate or juicy as that of the native bird.

The manure produced in this French establishment is no small item, and since it forms the very best fertilizer for many descriptions of plants, it is eagerly sought for at high prices by the market gardeners in the vicinity. The proprietor estimates the yield this year at about one hundred cords. He employs nearly one hundred persons in different departments, three-fourths of whom, however, are females. The sales of eggs during the past winter have averaged about forty thousand dozens per week, at the rate of six dozens for four francs, bringing the actual sales up to $5,000 in round numbers, for every seven days, or $260,000 per annum. The expenses of M. de Sora's hennery, including wages, interest, a fair margin for repairs, &c., are in the neighbourhood of $75,000, leaving a balance in his favour of $185,000 per year, almost as remunerative as Col. Fremont's Mariposa grant.

Boston Cultivator.

From the Rural American.

Profits of Fruit Culture at the South.

Friend Miner:—I am forcibly impressed with the deficiency of fruit—especially of fresh fruit, &c., in the Southwestern States in the winter season. Persons are often desirous of purchasing, and would pay good prices for fresh apples, or any kind of good mature fruit; but they cannot find any to purchase. Now, I would simply ask if the farmers and horticulturists were to devote more attention to the culture of fruit of all varieties, and such attention it would secure an abundant yield of fruit every year, and keep good supplies during winter, would it not pay, and that well? I think it would. Friend farmers, all of you that have never tried it, try it at once, and see if it wont pay; and especially you of the Southern States. I think your climate is well adapted to the culture of fruit as the Northern States. Many in the Northern States raise large quantities of fruit for market, and they say it pays large profits. Why would it not do the same here; are you afraid to devote any time to any thing but a *hog*, a *tobacco-plant* and a *corn-stalk?* Are you afraid of losing the little time and expense it would require to give it a thorough trial? I hope you are not afraid of that; for how do you know but that it would doubly and trebly remunerate you for all the time and labor expended on it? I think that the demand for fruit in this section (Tennessee) is far greater in both winter and summer than the supply, and I have no doubt that if you would increase the quantity, and improve the quality, you would increase the demand and enhance the price. I, for one, would be highly delighted to see farmers in this country try the experiment of raising fruit for market. If they are afraid that there would be no demand here, let them set their orchards and have them in good bearing condition by the time our railroads are completed and in good operation that are now being built.

Now, friends, I conclude this brief article in the hope that you will no longer lend a deaf ear to appeals of this kind, but will awaken to your interest and the demands of the country in which you live. M. W. ADCOCK.

Clarksville, Tenn., Nov. 10, 1856.

Cure For Chapped Hands.

Most of our juveniles during the winter season, are troubled with chapped hands; for the benefit of mothers, who are obliged to listen to the endless complaints, we publish the following recipe for chapped hands:—

"Take 3 drachms of camphor gum, 3 do. white beeswax, 3 do. spermaceti, 2 ounces olive oil—put them together in a cup upon the stove where they will melt slowly and form a white ointment in a few minutes. If the hands be affected, anoint them on going to bed, and put on a pair of gloves. A day or two will suffice to heal them.

Ought a Sleeping or Dwelling Room ever to be Built without a Chimney?—Professor Faraday has shown the chimney to possess very important functions in sanitary economy. Thus, a parlor fire will consume in twelve hours forty pounds of coal, the combustion rendering 42,000 gallons of air unfit to support life. Not only is that large amount of deleterious product carried away, and rendered innoxious by the chimney, but five times that quantity of air is also carried up by the draught, and ventilation is thus effectually maintained. Will hotel builders please look to this?

Gearing Teams according to Principle.

We invite the attention of our readers to the two communications which will be found below on the principles of draught and the gearing of horses and oxen according to them. They will be found worthy of reflection by those who will reflect on the subject. They are written by a friend of ours, to whom the farmers are indebted for very substantial services; and they embody the result of a great many experiments which he has worked out for himself. He has our thanks for what he has written in his own rough-hewed but nervous way. The quotation about "two blades of grass," &c., is tolerably well known, and has been pretty well acted on in Virginia. But is not something due to him who teaches us how to save our grass and corn as well as make it? And surely if we can do our work with one-third less expenditure of animal power, we may estimate a saving of half that amount in feed, to say nothing of the pleasure which every humane heart will feel in saving the wear and tear of his animals, and of the enjoyment which every intellect will experience in its successful application to the mechanics of agriculture.

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PROPER GEARING OF OXEN AND HORSES.

Many suppose that there is but one way to gear up an ox, because he is worked with a yoke around the neck.

The ox, like the horse, has his correct and incorrect lines of draught from which he pulls to advantage or disadvantage. In both the horse and the ox, to pull to the best advantage and with the greatest effect, both the weight and the power of each must be applied directly. For example—take that point on the shoulder of the horse which proves to be the centre of pressure on it for the pulling point, or the point where the traces should connect with the hames, and extend it back at right angles with the hame or shoulder, until that line strikes the earth, and you will have the line of that horse's power, or the line on which he can exert the greatest amount of power, and with the greatest ease to himself. There would be very few baulky horses, if all were geared in this way, because it is so much easier to the animal to perform his required labors when correctly geared than when not—and so it is with the ox. But it is more difficult to determine the pulling point on the ox than the horse. In the case of the ox with the use of the yoke, he pulls partly by yoke and partly by the bow, and consequently it is only by repeated experiments that the pulling point can be determined. Northern men have put the pulling point on the ox, at about one-third of the depth of his neck from the top where the bow works. But this seem a fraction too low down, causing the bow to press too hard on the lower point of the shoulder. I think one fourth from the top is nearer right than one-third. But either is a thousand times better than the ordinary way of working the straight yoke, which virtually throws the power and weight of the ox *under*, and not directly against the burden or load.

Now to construct a yoke so as to make the pulling point strike one-fourth from the top of the neck, supposing the neck to be 16 inches deep where the bow works—so shape it that when a line is drawn from one bow across to the other 4 inches from the top of each neck, (or the under part of the yoke where it rests on the neck,) said line will strike the exact point on the staples of the yoke against which the rings or hooks pass when they are pulling the load along. Thus constructed it will be needless to put one-half of the load on the necks to enable the team to carry it more easily thereby.

The wheel is an endless lever, and lessens the burden on the team in proportion to its diameter. Therefore put every pound on the wheels instead of the necks of oxen or backs of horses, and never pull on a pivot or centre in the yoke—for no two oxen working together are equal in strength or speed, and no man is competent to make allowances for the inequalities in the difference in the ends of the yoke—therefore have two pulling points instead of a central one from which to pull—make on the yoke a stretcher, similar in principle to the ordinary stretcher used in working horses to a wagon. Let this rule guide you—divide that part of the yoke measuring from the centre of each bow into three equal parts, and where the dividers touch the yoke, put in each of the two places a staple similarly fixed to the centre one, and pull on these with a forked chain instead of a single chain to the centre of the yoke, use the centre ring and staple to hold up the tongue of the

cart, and to pull *from* and not to pull *to*.—To the tongue fix permanently a forked chain to pull to.

With such fixtures, having two oxen, one of them with 1,500 pounds of power, the other with 1,000 of power, (if they are well broke,) you can carry 2,500 pounds, each ox exerting his whole power without affecting the other; whereas if you pull the same oxen on a centre or pivot, you can only carry from 1500 to 2000 pounds, because the strong ox can only balance the weak by an equal pull with him.

This plan is not only a means of carrying greater burdens, but it prevents oxen from pressing against and pulling from each other, from fighting whilst at work, from starting badly and baulking, and will keep up a steady even pull all the while.

The bow for an ox should be broad or flat where it rests against the shoulder, so as to press on a wide surface, and it should fit the neck; it should also be made wide at bottom and narrow at top. Again, whilst it should fit the entire neck it ought not to touch the throttle in the least, for if it does it will obstruct the breathing, and the cry of *short wind* will be heard, and the fine animal will be branded as worthless by an ignorant owner.

The best way to make ox bows is to get them as you do hames for horses, from the stumps or roots of trees, get them out in halves as you do hames—carefully fitting the neck from the throttle around the lower circle, and on the side of the neck up through the yoke, leaving about 1½ inches space just between the lower ends at the throttle—thus formed, get an old carriage or other spring ¼ of an inch thick, and sufficiently wide to give it strength, and rivet it well on the outside at the bottom so as to hold them permanently together. This will give you a most durable bow that will fit well every where, and never check the breathing in the least. Be sure in making this bow that the bottom be at least two inches in diameter: for then the space for the throttle will be ample—and we will venture that no judicious, intelligent farmer will ever work oxen in any other way, even if these fixtures must be procured at double their value.

In respect to gearing horses, we say, in a single word, that the traces should run back from the hames *exactly at right angles*, until they reach the back band, which should be placed on his back *exactly* where the saddle naturally rests, both the back band and the belly band should be fastened just at this point permanently to fit well. Then if the traces be hitched to any thing higher than the straight line of its direction from the hame to the back and belly banks, the animal will be enabled to exert his power to the best advantage under the circumstances, whereas if the belly band did not hold it down at that point, the trace would straighten, and the consequence would be that the hame and collar would choke the horse and destroy his power, besides throwing the pulling line above the centre of his weight and power, the reverse would produce the reverse effect. OBSERVER.

True Principles of Hitching Teams to their Work.

Brother farmer, what per cent. of power do you think is gained by hitching four horses *abreast* to a plow or railroad car over and above the mode of hitching them in the ordinary way, of two before two; thus placing the two front horses four or five times further from the load to be moved, than the other two?

I have selected the plow, and the railroad car, because the pull from the plow is different from that of the car, for which reason it suits my purpose best.

I suppose nearly all of you will readily say a very large per cent. will be saved by hitching all four horses abreast to the car. But to the plow if all four be hitched abreast, one or two of them will have to walk on the plowed ground, which in itself is so worrying and objectionable, that it is best to hitch two before two, and thereby make them pull the heavier burden, than to hitch a great deal nearer, and saved a large per cent. of power, thereby at the expense of walking on plowed ground.

Farmers differ a great deal on most subjects—but on this particular subject I am almost sure they are nearly all agreed. A very large majority believe that they can do as much work with three horses abreast as they or any one can with four, two hitched before two. Now, brother farmer, it is a thing simple and easy to test: but simple and easy as it is, not one of you in one thousand ever tested it correctly, or

has any idea of what is correct in the premises.

Go to work yourself, and by accurate experiment prove what is correct. Any of you can do it. Here is a plan for solving the problem, and though many of you may look upon it as a matter of moon shine, to understand and practice it will become a matter of *gold shine*

As it is more difficult to make this test with the plow than with the car, we will gear up four horses abreast and make them pull a car by a chain one foot long attached to a *dynamometer*—the car and load shall weigh 4,000 pounds, and the chain one foot long shall weigh two pounds.—The car moves as the team starts forward, and the dynamometer shows that the team has to exert, we will suppose, 800 pounds of power exactly to overcome the *friction* or *resistance.*

Now instead of the one foot of chain which attaches the team to the dynamometer, and that to the car we will add 20 feet more of chain, making 21 ft. of chain in this experiment, to see how much the resistance is increased, by removing the team a greater distance from the car to which they are pulling, we have already seen, that the pull (with one foot of chain) of 4,000 pounds shows a resistance or friction of 800 pounds, now with the same load and 20 feet of chain added, weighing 40 pounds, we will start up again. The dynamometer again shows the resistance or friction to be 808 pounds and no more. Why this small increase of 8 pounds resistance when 20 feet of distance was added and 40 pounds?

The reason is obvious, if 4,000 pounds in the first trial showed a resistance of 800 pounds, 4040 would naturally show a resistance of 808 pounds, for the friction is in the proportion of 1 pound to 5 pounds of weight to be moved. The distance 1 foot or 20 feet from the car, effecting no change whatever.

A word of caution just here may be necessary in reference to a similar test being attempted to be made with the plow; for it must be understood that in removing the teams an increased distance from the plow it will necessarily be made to run much deeper, and the increased depth of furrow will cause an increase of resistance. Now, brother farmer, am I humbugging you.—Try it yourselves, and see if this statement be true If true, apply it to practical purposes. Apply it to the plow, and have a beam sufficienty long to cause it to run steadily. Apply it to the plow in the hitching of your teams, and if you can spare a driver *extra* never doubt but that you can do one third more with four horses than with three—and if these ideas are not true correct them by a published statement that all may have the benefit of them.

OBSERVER.

As our friend "Observer" is hardly explicit enough in the conclusion of his remarks, we will venture to expand them a little. We presume he had in his mind the idea which prevails very extensively, and, as plough teams are *usually attached*, very properly, that three horses abreast will plough nearly if not quite as much in surface and in depth as four horses can working two and two. Whether the opinion is correct to the full extent is immaterial, it being, we conceive, true in the main, that the fourth horse and the extra driver do not pay by any, *if* any, very small increase in the width and depth of the furrow slice. Two reasons are given for this opinion:—1st. That the length at which the lead horses are hitched from the plough—being at the end of a chain which comes from the end of the beam—makes the beam itself, in effect, that much longer, and of course gives the plough a certain tendency to burrow into the ground; whilst the point from which the hindmost pair of horses work—at the end of the true beam, is, relatively, a short beam with a tendency to a level furrow, or, in some cases, a disposition to run out of the ground. Supposing the plough to have a proper "pitch" for either pair, it must have a wrong pitch for the other pair, because each works with a different line of draught. Consequently if the plough is pitched to the leaders, the wheelers, if we may so call them, will take it off the ground: if pitched to the wheeler, the leaders will bury the mould board. But as neither prevails, because counteracted by the other, there must be an irregular, wavy motion of the plough and a loss of power in its alternate dip and rise, or in the operation necessary to overcome it. In one word the plough is attempted to be worked the same depth with two different lines of draught. This argument is correct in the main as applied to the *usual* mode of attaching the team to the plough.

The second reason is, that the lead horses are hitched too far from their work, and that the mere distance between the power and the weight to be moved is a separate element to be taken into the calculation of this dynamical problem. This is demonstrably an error, as "Observer" claims.

We have said "as plough teams are *usually* attached." But there is a mode of obviating the difficulty; and a very simple one. It is to get two different points of attachment, each adjusted to the same depth of furrow, so that each pair of horses shall work in the same line of draught. These points, one higher and the other lower on the clevis, can only be ascertained by experiment on each class of ploughs, but when ascertained are certain for all ploughs of that class and pattern. This has been done, so far, by only one plough maker that we know of. But it has been done by him very satisfactorily. We allude to Mr. Geo. Watt of Richmond. [Ed. So. Planter.

On the Composition of some Soils on which Red Clover succeeds and Fails.

BY PROF. ANDERSON, M.D., CHEMIST TO THE SOCIETY.

In the *Transactions of the Highland and Agricultural Society* for January 1850, I published several analyses of soils, which appeared to throw some light on the cause of the failure of the red clover, a subject which at that time had attracted considerable attention. These results, though presenting several points of interest, illustrated very strikingly the difficulty too often encountered in the analysis of soils, for they led to negative rather than positive inferences. The most obvious conclusion deducible from them was, that they did not lend support to that view which attributes the failure of red clover to the deficiency or absence of gypsum in the soil, and which Sir Humphrey Davy had found to exert so powerful an influence upon that crop. In two instances sulphuric acid (which has generally been supposed to be the active constituent of the gypsum) was more abundant where the clover failed, although the difference was not sufficiently great to justify the supposition that it had any effect either favourable or unfavorable. The most remarkable conclusions were deduced from the analysis of a shale, and of the material composing the waste heaps of a coal-pit, containing above 10 per cent. of gypsum, and which produced a most luxuriant crop of clover, although the application of gypsum itself to the same soils had been entirely without effect. As it was clear that in this case it could not be the gypsum which produced the increase on the clover, I was led to attribute the effect to sulphate of magnesia, of which the substance contained about 5 per cent., and referred to a very interesting experiment by Mr. Maclean of Brainwood, in which the application of sulphate of magnesia produced nearly four times as great an effect as the same weight of gypsum.

Since these analyses were made, I have had no opportunity of submitting this subject to experiment, for the purpose of seeing whether the conclusions then arrived at would be borne out by further inquiry, until the present summer, when Mr. C. Lawson, jun. directed my attention to an instance in which the contrast between a good crop of clover on one part of a field, and its absolute and total failure on another part, was so striking as to merit careful examination. The field on which it occurred is on the farm of Thurston Mains, East-Lothian, lying on the old red sandstone, about three miles from the sea, at an elevation of 417 feet, and has an easterly exposure. It was drained in 1852, and appears to have been limed, although the time at which this was done is not known. The cropping for the last ten years has been as follows:

1847,	-	Black crop.
1848,	-	White crop.
1849,	-	Part black, part fallow.
1850,	-	White.
1851,	-	Pasture.
1852,	-	Oats.
1853,	-	Turnips.
1854,	-	White.
1855,	-	Turnips.
1856,	-	Wheat.
1857,	-	Hay.

The clover and grass seeds were sown along with the wheat in 1856, and no manure nor top-dressing of any kind has been applied since the turnip crop of 1855. At the west end of the field the clover is good; at the east end there is actually none; but the treatment of the whole field has been perfectly alike in all respects.—The samples submitted to analysis were

taken about 30 feet apart. No. 1 is that on which the clover succeeds; No. 2 that on which it fails.

Soils.

	No. 1.	No. 2.
Water,	2.76	1.40
Organic matter,	7.95	11.36
Alumina,	5.36	2.69
Peroxide of iron,	1.93	5.91
Carbonate of lime,	2.56	1.72
Magnesia,	0.78	0·25
Potash,	0.22	0.26
Soda,	0.92	0.71
Chlorine,	. . .	0.004
Sulphuric acid,	0.21	0.034
Phosphoric acid,	0.01	0.049
Soluble silica,	0.56	0.40
Insoluble silicates,	76.83	74.66
	100.09	99.437

Subsoils.

	No. 1.	No. 2.
Water,	2.01	2.52
Organic matter,	4.43	1.98
Alumina,	1.43	2.43
Peroxide of iron,	7.70	1.32
Lime,	0.64	1.10
Magnesia,	0.17	0.27
Potash,	0.24	0.25
Soda,	1.24	0.48
Chlorine,	0.01	0.007
Sulphuric acid,	0.12	0.062
Phosphoric acid,	0.03	0.090
Soluble silica,	0.36	0.281
Insoluble silicates,	81.76	88.64
	100.14	99.430

When these analyses are compared with one another, they present a very close similarity. The most prominent difference lies in the quantities of peroxide of iron and alumina, for though the sum of those substances is nearly the same in both soils, amounting to 7.29 per cent. in the first, and to 8 60 per cent. in the second, by far the greater part consists of alumina in the former, and of peroxide of iron in the latter case. But though this difference is sufficiently conspicuous, we cannot attribute to it any influence upon the crop, for all our knowledge tends to show, that iron, when in the state of peroxide, produces no effect either beneficial or otherwise upon vegetation. I must not be understood to assert that it is a useless constituent of a soil, for that it certainly is not, because we know that it must be absorbed to a small extent by all plants, and through them must be conveyed into the animal frame of which it is an essential part; but simply that as in all soils its quantity is greatly in excess of the possible requirements of plants, variations in its proportion are practically of no importance. On looking to the substances more immediately important to the plants, we find but little to attract attention. Both are well supplied with lime and magnesia, and in this respect surpass many soils of acknowledged excellence. The proportion of alkalies is not only large, but is so nearly the same in both, that it is very clear that they can have no influence whatever in producing the failure of the clover. In regard to the acids, we are at once struck by the small proportion of chlorine, which amounts only to a barely appreciable trace in No. 1, and in No. 2 to 0.004 per cent., or less than 90 pounds per acre, which quantity, however, is found in the soil on which the clover fails. On the other hand, the quantity of sulphuric acid in the first soil is more than six times as large as in the second; and from this we might derive a confirmation of the view so commonly maintained regarding the importance of sulphuric acid for this crop, which, however, the experiments already referred to as having been made some years since, are very far from supporting. The phosphoric acid of the soil on which the clover fails, is about five times as large as in the other; and the result is thus opposed to the opinion expressed by a writer in the *Farmers' Magazine* some years since, who mentions that since he had employed dissolved bones, clover sickness had disappeared from his farm, from which fact it had been supposed probable that it might be due to deficiency of phosphoric acid. By thus passing in review all the different constituents of these two soils, we only see more distinctly how similar they are. In point of fact, there can be no doubt that had the samples been taken from different parts of the portion on which the clover succeeded, as great differences in composition would have been observed; and it is not unimportant to notice, that had any one been asked to decide as to the comparative values of these two soils, he would give the preference to No. 2, which contains so much more phosphoric acid than the other.

The observations which have been made with regard to the soils, apply with almost

equal force to the subsoils, as far at least as those constituents which form the important parts of the food of plants are concerned. But there is a marked difference in the quantity of iron and alumina, the sum of the two amounting in the subsoil No. 1 to 9.13 per cent., and in No. 2 to no more than 3.75. This indicates that the first is a much heavier and more retentive subsoil than the last, and it is possible that this may have some effect upon the success of the crop, for in a dry season the soil, which rests on a retentive subsoil, would not suffer so much from the drought, as that resting on a more open substratum. This is probably not sufficient to account for the very remarkable difference in the crop.

We are constrained, therefore, to admit that these analyses lead to negative results; but they are nevertheless very instructive. The case being one of the most complete failure in one part of the field, contrasted with as complete success in another part, afforded a most favourable opportunity of ascertaining whether the clover sickness can be attributed to any peculiarities in the chemical composition of the soil, and, taken along with the analysis of soils recorded in the number of the *Transactions* already alluded to, there can be little hesitation in arriving at the conclusion that it does not depend upon this point; but whether it is due to any physical peculiarities of the soil, it is impossible, in the present state of our knowledge, to ascertain with any degree of certainty.

The failure of some of our most important crops is a subject of the highest importance to the farmer, and any information bearing upon its cause, however limited it may be, has its importance to him. The extent to which it occurs in some plants seems to preclude the possibility of attributing it to the chemical composition of the soil, for it is found to an equal extent even where that differs excessively. There seems no doubt, however, that it is connected in some way or other with the too frequent recurrence of the same crop on the same soil; but the most singular and mysterious fact is, that it does not occur equally with all our cultivated crops. It is observed most conspicuously in clover and the turnip, while little or no injury appears to result to the cereals in the same way. A good, or, at all events, an average crop of wheat may, by good manuring, be obtained for any number of successive years on the same land, and no failure of it or any other grain, at all comparable to the failure of clover, has ever been observed, although all of them recur more frequently in the ordinary course of rotation than those crops which suffer so much. The cause of this merits investigation; but we must not conceal from ourselves the difficulties of the inquiry. We can understand how it is that a crop like the turnip, which, when cultivated, is in so entirely an artificial state, but it is not so easy to see how a forage plant, which, though cultivated, is still in a natural condition, should be so liable to injury. On the whole, we must admit the importance of a more minute study of the habits of clover, and particularly of the influence of various salts on its growth. Even the effect of gypsum requires to be examined, and additional experiments with sulphate of magnesia would be a matter of interest, for it is remarkable that Mr. M'Lean's trials of that salt, which proved so successful, have not been repeated by any other experimenter.

Some Suggestions for Experiments upon the most economical mode of using Phosphates as Manure.

When the use of artificial manures began to become general in this country, some ten or fifteen years since, the common opinion among our most skilful farmers was almost universally in favour of those which contained a larger quantity of ammonia. But though the value, and indeed the necessity, for an abundant supply of that constituent of the food of plants is as fully acknowledged as ever, there has been of late years a considerably increased tendency towards the employment of the phosphatic manures. The consumption of superphosphates of different kinds, and other phosphatic manures, has for the last five or six years been increasing in Scotland in a much more rapid ratio than that of Peruvian guano; and during the last two seasons the increased price of the latter has greatly stimulated the demand for the former manures. The consequence has been, that many farmers who were formerly the most staunch supporters of Peruvian guano, have begun to

find that they may with safety, sometimes even with advantage, diminish the quantity of that substance employed by them, and replace it with some of the more phosphated manures. Whether this change of opinion be due to the fact, that formerly the Peruvian guano was used with but little consideration, and in such quantity that part of its ammonia was practically lost, or whether it be that a soil is benefited by a change of manure just as a change of crop is required, it is not necessary for us to consider here. It is enough that the change has taken place, and with it has arisen the necessity for a more careful determination of the most economical mode in which those substances may be appl ed to the soil.

Phosphoric acid, as is well known, is employed agriculturally in two different states of chemical combination, either as the ordinary phosphate of lime, such as occurs in bones, and which is insoluble in water, though readily dissolved even by weak acids; or as the bi-phosphate of lime, into which the former is converted by treatment with an acid, and distinguished by its ready solubility in water. All natural phosphatic manures contain their phosphoric acid in the first of those conditions. Bones, coprolites, bone-ash, &c., are entirely insoluble, and though some guanos, and in particular Peruvian, contain a small quantity of soluble alkaline phosphates, their proportion is in general only a minute fraction of that which is insoluble. Now it is an admitted fact that all substances which are to become food of plants can enter into their system only in the soluble form, and, by some means or other, the insoluble phosphate of lime must be made soluble in the soil. The agent by means of which this important change is produced, is the carbonic acid of the air, or, in all probability, to a still greater extent that which is developed by the slow decomposition of the organic matters of the soil itself. But as carbonic acid is the weakest of all acids, its action upon the phosphates is necessarily slow and imperfect, and when the substances are of a compact nature, or are employed in fragments of considerable size, its solvent power is still further restricted.—Hence it is that bones, when employed in the shape of inch or half-inch bones, produce a comparatively limited effect, and coprolites, even when ground, act so slowly as to possess but little value to the farmer. In these cases it is necessary, in order to bring out the full effect of the phosphates, to reduce the bones to a fine powder, by which means a far more immediate and striking result is produced. It is obvious, however, that the only effect produced in this way is that of affording an increased amount of surface for the carbonic acid to act upon, and that the finest pulverization must yield to the chemical processes which convert the phosphates into a condition in which they are soluble and fitted to enter directly into the plant. In this lies the great importance of Liebig's suggestion of converting the common insoluble phosphate of lime into the soluble bi-phosphate, and which has proved so important an assistance to modern agriculture. The amount of economical advantage derivable from the action of the sulphuric acid must unquestionably depend, to a very large extent, upon the condition in which the phosphates originally existed. Thus, for example, ground bones, although containing only the insoluble phosphate of lime, may be used with advantage; while coprolites, even when well ground, produce comparatively little effect. Bones are naturally comparatively soft, and, owing to the decay of their organic matters in the soil, are easily disintegrated, and their phosphate of lime is consequently brought into a high state of division, and is readily acted upon by the weak acids of the soil; while coprolites, on the other hand, are extremely hard and compact, and can only be affected by slow degrees. Hence it is that sulphuric acid does more for the development of the manurial action of coprolites than of bones; in fact the latter, unless dissolved by means of acid, are of comparatively small practical value.

When the mode of action of sulphuric acid is attentively considered, we observe some points which merit a more general consideration than they have hitherto obtained. It is particularly to be noticed that by means of its action, the insoluble phosphate of lime is converted into another compound, which is very readily affected by the constituents of the soil, and by them brought back into an insoluble form. This occurs, of course, most rapidly in calcareous soils, in which the large quan-

tity of carbonate of lime soon reduces the phosphate of lime to its ordinary condition; but even soils which are not of the calcareous variety, contain a sufficiently large quantity of lime and magnesia, as well as of other bases, to produce this effect. A soil containing only one per cent of lime, which is probably rather under than over the average, contains per acre six tons of lime, and is consequently capable of easily converting into the insoluble form many times the quantity of superphosphate usually applied to it. The rapidity with which this change takes place must depend upon a variety of circumstances; but that it does occur cannot be doubted; and it is clear that a considerable part of the value of the process of solution must depend, not so much on its bringing the phosphates into a state in which they can be directly absorbed by the plants, as simply on their reduction to a higher state of division, and their more complete and thorough dissemination through the soil. In fact the rain, in the first instance, dissolves the bi-phosphate of lime which is thus conveyed to all parts of the soil, and there rendered insoluble; and hence the action of sulphuric acid is really, to a great extent, a means of disintegration much more perfect than is practicable by any mechanical process.

It comes, then, to be a question of great practical importance to determine whether the soluble is always the most economical form in which phosphates can be employed. That it often is so cannot be doubted; but it may be questioned whether there are not instances in which insoluble phosphates, in a sufficiently high state of division, may not be made use of with equal if not with superior advantage. It seems probable, indeed, that superphosphates are often employed without any fair and complete comparison with other manures of the same class, and on looking to the results of field experiments, we cannot fail to be struck by the small amount of definite information they present on this point. Abundance of experiments exist in which the effects of Peruvian guano are contrasted with those of bones, or dissolved bones, but very few indeed in which the effects of the latter, and more particularly those kinds which are manufactured from coprolites or bone-ash are compared with those of the better class of phosphatic guanos, or generally with insoluble phosphates.—The subject is one which merits further and careful experiment; and the considerations on which we are about to enter will serve to show its importance.

In order that the matter may be fairly illustrated, it is necessary for us to call to mind that the price paid for the ordinary phosphate of lime amounts, at the present moment, to from L.7 to L.10 per ton; but when converted into the soluble form, its value has been variously estimated by different persons at from L.25 to L.32 per ton. Hence the cost of rendering phosphate of lime soluble is from 200 to 300 per cent. of its value, and it is possible to buy three or four times as much insoluble phosphates for a given sum as of soluble phosphates. The question which the farmer has to solve is, whether the productive power of phosphate of lime is increased three or four fold by solution in sulphuric acid. The experiments on record do not enable us to come to satisfactory conclusions on this point; but their tendency is to show that the increase in manurial effect is not generally so great as this. In the case of coprolites, it is probable that the increase in value is in this, or possibly even in a higher ratio, because in their natural state they act very slowly; but if we confine our attention to the more pulverulent varieties of phosphates, we should in all probability be led to an opposite conclusion. If, for instance, we compare a highly phosphatic guano, such as Saldanha Bay, which contains about 56 per cent. of phosphate, with a superphosphate containing 20 cent. of soluble, and 10 or 15 per cent. of insoluble phosphates, it may be doubted whether the effect produced by the latter is as much greater than the former as would be expected upon this principle. For if we assume the manurial value to be estimated by the price, then the 20 per cent. of soluble phosphates in the superphosphate should be equivalent to 80 per cent. insoluble, and the whole quantity of phosphates should produce nearly twice as great an effect as the 56 per cent. in the guano—a result which in practice would not in all probability be obtained; and when the effect on future crops of the quantity of phosphates not taken up by the first is reckoned, it may be questioned whether the advantage is not in favour of the latter.

It is unnecessary to remark that, if it were possible for us to dispense to any extent with the expensive process of dissolving in sulphuric acid, the result would be a very material economy in the cost of manuring with phosphates. Raw bones are at present sold from £6 to £6 10s. per ton; but when ground to fine dust, they cost from £8 15s. to £9; so that the cost of grinding is upwards of £2 per ton.—That of solution in sulphuric acid is still greater. for a ton of bones yield about one and a half tons of superphosphate, which would be sold at not less than £9 per ton; and the one and a half costing thus £13 10s., no less than £7 must be paid for dissolving one ton of bones; or, in other words, the price of the bones is more than doubled by the process of solution; and, moreover, not more than half of the phosphate of lime would in this case be brought into the soluble form.

Experiment has shown that the more finely bones are ground the more rapid is their action. But even when reduced to the finest dust, they are a comparatively coarse powder; for the toughness conferred upon them by the large quantity of gelatinous organic matter which they contain, prevents their being brought into a high state of subdivision; and hence, even in the finest dust, they are coarse when compared with guano; and if compared with a sample of the latter substance of the same composition, we should, on theoretical grounds, anticipate a more immediate effect from the guano. On the other hand, the application of an acid to the bones would in all probability make them surpass the guano; but then the price of the bones is thereby doubled; and the question which the farmer has to consider is, whether this cost is justified by the results. This point can be determined only by experiment; and I propose, therefore, to suggest some trials which might be advantageously made in the field; and I am induced to do so by the small amount of information I have been able to extract from the experiments on record, and the fact that some forms of phosphates have come to be imported into this country which deserve to be compared with guano and superphosphate.

Some time since I directed attention to the importation of bone-ash, which I believe has hitherto been almost, if not altogether, consumed by the superphosphate manufacturers. Two analyses were then given, which, however, indicate a much lower value for the bone-ash than samples since imported. The subjoined table gives the results of a larger number of analyses of different cargoes:

No.	Water.	Charcoal.	Phosphates.	Carbonate of Lime.	Alkaline Salts.	Sand.
1	9.64	1.39	79.23	5.44	....	4.30
2	10.20	4.38	58.03	4.23	0.88	22.48
3	17.03	....	47.78	9.37	....	25.82
4	8.08	1.63	81.68	5.02	....	3.59
5	7.16	1.29	81.30	6.10	....	4.15
6	1.78	1.38	81.21	7.07	....	8.56
7	1.89	3.98	81.89	6.79	....	5.45
8	0.72	1.23	90.65	3.40	....	4.00
9	8.61	2.39	73.39	5.02	0.33	10.26
10	5.96	2.51	79.08	6.01	....	6.44
11	11.41	3.19	73.57	5.91	1.05	4.87
12	12.04	3.72	57.43	....	6.21	20.60
13	5.07	1.57	75.86	4.45	....	13.05
14	6.10	0.91	70.17	13.65	....	9.17
15	5.65	0.85	75.65	7.25	....	10.60
16	10.45	2.63	64.77	11.53	1.08	9.54
17	8.00	2.35	73.30	4.00	0.80	11.55
18	8.90	4.45	52.35	6.05	....	28.25

We see now that this article, when of good quality, contains above 70 per cent. of phosphates, and the practice is to sell it according to the per centage, £7 per ton being the price of a sample containing 70 per cent. Now, if this be compared with Saldanha Bay, or any similar guano, which would at present be sold at about £9 per ton, it must be considered as a cheap source of phosphates. Of course it is not in the same state of division, but it is to be remembered that it can be ground with great ease, and at a price which would not exceed from 10s. to £1 per ton. The farmer would thus obtain a well-ground article, containing 70 per cent. of phosphates, for less than £8 per ton; and if this were mixed with a small quantity of sulphate of ammonia, or of Peruvian guano, it appears probable that very good effects would be obtained from it at a very moderate rate. A mixture of 17 cwt. of bone-ash and 3 cwt. of Peruvian guano, supposing both of fair quality, would, at a cost of under £8 per ton, yield a manure containing 65 per cent. of phosphates, and 2.5 of ammonia; and it would be extremely interesting and important to have a set of careful experiments, in which its effects for-

two or three years were compared with those of a superphosphate at the same price.

So likewise the reduction of bones by fermentation requires to be submitted to careful experiment, and the results compared with those of superphosphate. But here the risk of loss of the nitrogen of the bones requires to be guarded against, by conducting the process with great care, and stopping it before the decomposition has advanced too far. Some analyses made lately in the laboratory show that, when this is not attended to, the loss may be considerable; but if the fermentation is limited, it is very trifling. The following are the analyses of a sample of bones before and after fermentation, which are almost identical in composition:

	Unfermented.	Fermented.
Water, -	6.90	6.59
Organic matter, -	29.70	29.91
Phosphates, -	54.30	55.95
Carbonate of lime,	4.00	3.80
Alkaline salts, -	0.25	1.25
Sand, -	4.85	2.50
	100.00	100.00
Ammonia, -	4.23	4.13

Here, there is practically no loss of ammonia. But I do not give this as a perfectly satisfactory case, for the fermentation was conducted on a small quantity, and had not advanced very far. The same bones when fermented on the large scale, after the addition of 2 cwt. per ton of sulphate of ammonia, gave, on analysis—

Water, - -	7,10
Organic matter, -	27.30
Phosphates, -	56:40
Carbonate of lime, -	3.95
Alkaline salts, -	1.85
Sand, - -	3.40
	100.00
Ammonia, -	3.90

In this case the results are very remarkable, for the whole of the ammonia of the sulphate, along with a small quantity of that originally present in the bones, has disappeared. I have no doubt, however, that by judicious fermentation of the bones alone, they might be reduced without any material loss. In this case the addition of the sulphate of ammonia before fermentation must be considered as having been injudicious.

It only remains for me to suggest some experiments, which would be of much value in the coming season. I propose, therefore, that any person desirous of doing so, should try ground bone-ash, mixed with Peruvian guano in the proportions already indicated, in the proportion of 5 cwt. per acre; the same quantity of bone-ash alone, and of superphosphate of good quality. Saldanha Bay guano, or some variety of similar composition, should also be tried. On the other hand, equal weights of finely ground bones, of fermented bones, and dissolved bones, should be used.—These should be applied on portions of land which have got no other manure, and should be compared with an entirely unmanured plot and a plot which has received the ordinary quantity of farmyard manure. Such experiments, if made in several different localities, would add much to our knowledge of the principles on which these manures may be most advantageously used.—*Transactions of the Highland and Agricultural Society of Scotland.*

Farm-Yard Manure.

BY CUTHBERT W. JOHNSON, ESQ., F. R. S.

We can hardly too often recur to the subject of manure. It is only by the aid of fertilizers that man maintains the incessant contest which is ever going on between his crops and their soils. If he is skilful and industrious in the application of dressings, his lands are rendered at least as fertile by tillage, and commonly more so, than when left to nature's care. But if he is either careless in their preparation, or ignorant of the common-sense results of neglect, his manure is impoverished, and his farm becomes diminished in value. The preparation of his farm-yard manure is the most generally important of all his dressings. It is here that many mistakes are apt to be made, not only by the farmer, but by those laborious chemists who have, during the present generation, so materially promoted the advancement of agriculture.

These errors are, in some degree, attributable to the natural difficulties of the subject. The merely procuring a fair specimen of farm-yard manure for analysis is no easy task. It is often very different in composition, on different sides of the same yard. Some specimens, even

from the same spot, contain more straw than others, or different kinds of straw; others abound too much in the dung of one kind of animals. Then, again, one yard is cooler or drier than another, has a favourable or unfavourable aspect. In one the stock are better fed, in another the food is oftener changed. These and many other sources of variation ever render comparative chemical examinations of yard-compost less valuable than when we are examining other fertilizers. Still these are not reasons why we should abandon those valuable investigations. They are the very arguments why we should extend and verify our trials. Of that opinion is, evidently, the enlightened professor of chemistry at Cirencester; and what Mr Voelcker has recently been illustrating will well repay my reader, on some November evening, for the most careful consideration. He may perhaps, in reading the professor's valuable paper "On Farm-Yard Manure, and the Drainage of Dung-heaps," (*Jour. R. A. S. vol* xviii., *p.* 111,) find some practical conclusions to which the results of his own experience may be opposed. But let such an inquirer reflect upon the varying influences under which farm-yard compost is prepared; and, in any case, let him not forget that it is only by repeated and patient inquiries after truth that her confines are even approached. Two very material questions here engaged this accurate chemist's attention: the loss of ammonia during 1, the preparation of yard-manure; and 2, after it had been made into compost heaps. We shall see that he was not unmindful of either its gaseous emanations, or of its loss in the drainage water.

It is satisfactory to find, from these researches, that the loss of ammonia from fermenting dung is commonly not so considerable as is sometimes believed. We are, in these inquiries, perhaps too ready to be deceived by careless observation. "There are many people, (observes Mr. Voelcker,) who run wild with the idea that everything that smells strongly must contain free ammonia; but that is far too sweeping a conclusion. In the case of horse dung, for instance, we are too apt to believe this loss to be far greater than it really is. Yet, (as the professor adds,) although in fermenting horse-dung the proportion of nitrogen is larger than in fresh, which agrees well with previous analysis of fresh or rotten common yard-manure, yet in perfectly fresh horse-dung the amount of free ammonia is scarcely weighable, it being only about 3 parts in every 100,000 parts of dung, or 3 lbs. for every 40 tons; the same description of manure in an active state of fermentation yields somewhat more, but still a very inconsiderable quantity of free ammonia.—Thus under the most favourable circumstances 100,000 parts of horse-dung yield only 49 parts of free ammonia; or in other words, 40 tons in round numbers yield, on long-continued boiling, 49 lbs. of ammonia. It must not be supposed, however, that this quantity of ammonia is dissipated into the air during the fermentation of the dung, for it is only in the interior of the dung-heap that ammonia is liberated. It is, indeed, only on turning a heap that ammonia escapes at all, in any perceptible degree; but as soon as the external layers have become cooled down to the ordinary temperature of the air, its escape is arrested. There can, therefore, be not the slightest doubt that but a very minute quantity of ammonia passes into the air, and the remainder is fixed in the heap, provided the heap is kept in such a manner that rain cannot remove from it much of the soluble matters, and with them ammoniacal salts.

"The strong smell which is observed, on turning a dung-heap, no doubt has led many greatly to over-estimate the amount of ammonia which escapes from farm-yard manure in an active state of fermentation. But I would observe that nothing is more fallacious than the estimation of the amount of ammonia by the pungency of the smell which is given off from fermenting animal matters. Such matters often give off a very powerful smell, which is due to peculiar volatile organic combinations—to some sulphuretted and phosphoretted hydrogen and a great variety of gaseous matters, amongst which there is ammonia gas in very minute quantities.—The smell of this highly complicated and but scantily examined mixture of gaseous matters as a whole is ascribed by the popular mind to ammonia. From these products of putrefaction, however, ammonia can be completely separated, without in the least destroying the peculiar offensive smell which emanates from organic mat-

ters in a state of decomposition. If, for instance, dilute sulphuric acid is added to farm-yard manure or liquid manure, the smell of these substances, instead of becoming neutralized by the acid, in reality becomes more offensive. This arises in great measure from the liberation of sulphuretted hydrogen. Hence acids are not well adapted for disinfecting cesspools or night-soil. As dilute sulphuric acid neutralizes instantly free ammonia, forming with it an inodorous salt, which is not volatile at the ordinary temperature, it is evident that the fœtid smell of putrefying matters has much less to do with ammonia than is generally believed."

We see then, from the result of such examination, that in the preparation of dung, if the heat generated is not excessive, that then the ammonia evolved is far from being considerable.

But if we have attended to this, if we have carefully prepared the dung, still another care then arises, its preservation from rain, and consequent impoverishment by drainage. Mr. Voelcker alludes to the too frequent neglect of this precaution, when he tells us that "in many places in England, especially in Devonshire and in some parts of Gloucestershire, it is a common practice to place manure-heaps by the road-side, often on sloping ground, and to keep these loosely erected heaps for a considerable length of time before carting the dung on the field. On other farms, the manure is allowed to remain loosely scattered about in uncovered yards for months before it is removed. Heavy showers of rain falling on manure kept in such manner, by washing out the soluble fertilizing constituents of dung, necessarily greatly deteriorate its value. It is well known that the more or less dark-coloured liquids which flow from badly kept dung heaps in rainy weather possess high fertilizing properties. According to the rain which falls at the time of collecting these drainings, according to the character of the manure, and similar modifying circumstances, the composition of the drainings from dung-heaps is necessarily subject to great variations. The general character of these liquids, however, is the same in dilute and in concentrated drainings. Several samples of dung-drainings were recently examined by me, and, from their analysis, it will be seen that they contain a variety of fertilizing constituents which it is most desirable to retain in dung-heaps.

"According to the analytical results obtained in these different determinations, an imperial gallon of these drainings contained,—

Volatile and combustibe constituents 395.66 grains.			
Viz:—			
Ammonia driven out on boiling, ...	36.25	Together. 39.36	
Ammonia in the state of salts decomposed by quick lime,	3.11		
Ulmic and humic acid, ..		125.50	
Carbonic acid, expelled on boiling, ...		88.20	
Other organic matters, (containing 3.59 of nitrogen),.		142.60	
			395.66
Mineral matters (ash) 368.98 grains. Viz:			
Soluble silica, ...		1.50	
Phosphate of lime, with a little phosphate of iron,..		15.81	
Carbonate of lime, ...		34.91	
Carbonate of magnesia, ..		25.66	
Sulphate of lime,..		4.36	
Chloride of sodium, ...		45.70	
Chloride of potassium,. ..		70.50	
Carbonate of potash, . ..		170.54	
			368.98
Total per gallon in grains, ..			764.64

"These analytical results suggest the following remarks:

"1. It will be seen that these drainings contain a good deal of ammonia, which should not be allowed to run to waste.

"2. They also contain phosphate of lime, a constituent not present in the urine of animals. The fermentation of the dung-heap thus brings a portion of the phosphates contained in manure into a soluble state, and enables them to be washed out by any watery liquid that comes in contact with them.

"3. Drainings of dung-heaps are rich in alkaline salts, especially in the more valuable salts of potash.

"4. By allowing the washings of dung-heaps to run to waste, not only ammonia is lost, but also much soluble organic matter, salts of potash and other inorganic substances, which enter into the composition of our crops, and which are necessary to their growth.

"A dung-heap composed chiefly of mixed fresh horse's, cow's, or pig's dung, furnished the material for another analy-

sis of drainings. This liquid was much darker than the two preceding liquids, possessed an offensive smell, although it contained no sulphuretted hydrogen, and was collected at a time when no rains had fallen for several weeks, which circumstance accounts for its greater concentration. It was submitted to the same course of analysis as the first drainings. 7,000 grains evaporated to dryness produced 135¾ grains of dry matters; and this quantity, on burning in a platinum dish, furnished 62½ grains of mineral matters.

"The following table represents the composition of the solid substances found in one imperial gallon of drainings from fresh manure:

Composition of Solid Matters in one Gallon of Drainings from Fresh Farm-yard Manure.

Ready-formed ammonia, (principally present as humate and ulmate of ammonia),	15.13
Organic matters,	716.81
* * Inorganic matters, (ash),	625.80
Total amount of solid matter in one gallon of drainings,	1357.74
Containing nitrogen,	31.08
Equal to ammonia,	37.73
* * 625.80 of ash consisted of:	
Silica,	9.51
Phosphates of lime and iron,	72.65
Carbonate of lime,	59.58
Sulphate of lime,	14.27
Carbonate of magnesia,	9.95
Carbonate of potash,	297.38
Chloride of potassium,	60.64
Chloride of sodium,	101.82

"It will be observed that these drainings contain about double the amount of solid matter which was found in the liquid from the first heap. The composition of this solid matter compared with that of the solid matter in the liquid from the first heap, moreover, presents us with some particulars to which it may be advisable briefly to allude.

"In the first place I would remark that notwithstanding the greater concentration of the third liquid, as compared with the first, the proportion of ammonia present in the form of ammoniacal salts is less than one half; for, whilst the first drainings contained in the gallon 39 grains of ready formed ammonia in round numbers, the third drainings contained only 15 grains per gallon.

"It thus appears that drainings from manure-heaps in an advanced stage of decomposition contained, as may be naturally expected, a larger proportion of ready formed ammonia than the liquid which flows from heaps composed of fresh dung. It is further worthy of notice that the first drainings contained nearly all the nitrogen in the form of ammoniacal salts, whilst the drainings from fresh dung contained the larger proportion of this element in the form of soluble organic substances. The most important constituent of farm-yard manure, *i. e*, nitrogen, thus is liable to be wasted in the drainings, whether they proceed from rotten or fresh manure, for in either case it passes off in a soluble state of combination."

Now, how do these laboriously obtained results accord with what we see in our own homesteads? If there must be uncovered yards, if the rain must shower down over their contents, do we always strive to diminish this as much as possible? Do we reflect that if our farm-yard buildings cover an acre of ground, that upon that acre of slate or thatch about 2,500 tons of rain water annually fall? Do we not know that if proper eaves troughs are not provided, that then this large amount of water needlessly and injuriously mingles with the farm yard dung? and that too in addition to the 2,500 tons of rain water per acre which fall on those uncovered yards? It may be true that it is difficult to entirely prevent this loss, but there are few cases in which it may not be diminished. And then the placing the compost heaps in bad situations, or in "pies" too large, are errors equally easy of being avoided. It is only by such small savings, let us ever remember that considerable accumulations are made; no one can feel this more than the agriculturist, for he is ever surrounded by other sources of waste (besides those on which I have been dwelling); insects, weeds, vermin, parasites of all kinds, haunt his footsteps; he does not always even *see* these robbers at their work; he traces them, like the march of other marauders, only by the fields they have laid waste, the food they have destroyed; just as, in the subject of this paper, the enriching gases and soluble matters of the manure unnoticed steal away to perhaps carry disease and discomfort to places to which they ought rather to have conveyed fertility and happiness.—*British Farmers' Magazine.*

Horticultural Department.

E. G. EGGELING, Contributor.

Women and Flowers.

Wordsworth, we believe it was, who is reported to have said, "that there were three things which he expected and desired to find in heaven, children, sunshine, and flowers," and certainly the association is pure and pleasant enough to convert the dreariest desert into a paradise. It was a pleasant fancy at all events, thus to link together this trinity of blessings; and with something of a kindred spirit, we have been accustomed ever to associate in our minds, women and flowers, so that one invariably suggests the other. They are blended together in our thoughts, and we never look upon a well stocked, well kept flower garden, but that we forthwith conclude that there is a member of the gentler sex residing on the premises.

It is told of a traveller through some of the counties of Eastern Virginia, some years ago, that on passing sundry and numerous residences on his road, he remarked to his companion, (who was familiar with the country, and knew the correctness of each guess,)—

"There lives a widow."

This occurred so often that the other in astonishment asked:

"How is it, that you, a stranger here, can so readily tell when you pass a farm owned and occupied by a widow?"

To which the other replied:

"When I see a large orchard, with a still house close at hand, I do not venture much in supposing that the owner did not live many years in that vicinity."

So, but for other reasons, when we pass a homestead, about which we see shade trees, evergreens, and flowers, we judge that a woman lives there, that there is a home, in the truest and best sense of that significant word, and that the gentle ministry of "God's last, best gift to man," is there bestowed, to

> "Render the paths of peevish nature even,
> And open in each heart a little heaven."

Per Contra. When in our travels, we have passed by a farm house, which stood a short distance from the stable and barn, with the wheat field, or corn field, or tobacco lot, coming close up to the door of the dwelling, without shade or anything else to relieve the dreariness of the scene—from this absence of everything like grace, polish, refinement of taste, and beauty, we have argued the denizen of the dwelling to be a sour, repulsive, crusty old bachelor, whose lodging place was most appropriately put in close proximity to that of "the beasts of the stall," and the event has generally proved the correctness of our judgment in the premises.

The unamiable occupant of such premises as the preceding paragraph describes, would very likely reply, that it is fitting to combine in one sentence, women and flowers, because they are alike merely ornamental, and subserve no useful purpose; but we tell him that each occupy that sphere for which the Creator designed them, and that the world is better for both; that it would be less desirable as the abode of a race of intelligent and rational beings if it were deprived of either. Without these, the world might answer as well for the abiding place of brutes, and all the rest of the animated creation, but man would find it cold, chilling, and uncongenial.

But we depart from our main design, which was to insist that every man in the State that has a daughter, ought, for her sake, to have attached to the homestead a flower-garden.—When we say, a flower-garden, we mean what we say, and not that there should be in the kitchen garden, among the vegetables, a few flowers, though that is better than no flowers at all. But that will not satisfy us. We go in for nothing less than a *bona fide* flower-garden, one large enough to contain roses, hyacinths, tulips, poppies, violets, chrysanthemums, marigolds, verbenas, and other floral beauties and treasures. This is what our farmers ought to have, a flower-garden, a garden dedicated to the cultivation of flowers, whether the space it occupies be smaller or larger.

We say that there should be such an appurtenance to every homestead, where there are girls, and we have used this language designedly. True, our preference would be, for a flower parterre on every farm, without regard to the sex of the occupants, but there are peculiar reasons why there should be a flower-gar-

den attached to the farm whose owner has daughters. These have need of it, and will be greatly benefited by it. The crying need of the young ladies of Virginia is employment—something that will give occupation to their hands and heads, besides the eternal stitching and crocheting, with which they spoil their eyesight and impair their constitutions. The young ladies of the State require some occupation which will take them oftener into the open air, which will give them more out-door engagements, which will require effort, exertion, and exercise, beyond the compass of their parlors and chambers.

Any well informed medical man in your vicinage will confirm the truth of these observations. He will tell you that the extreme delicacy of our young ladies, their fatal susceptibility to the changes of our climate, their liability to coughs, consumption, and other dangerous and painful forms of disease, their inability to meet and endure the trials of married life, and the early decadence of youthful bloom and beauty, is largely attributable to their habit of staying in-doors, and to their lack of healthful exercise, beneath the bending skies. The English girl, whether of noble or ignoble birth, is the very opposite of the American girl, in respect to exercise out of doors. She spends much time in the open air, gains elasticity and vigour by inhaling plentifully the pure, balmy breathing of the winds, and grows up vigorous, hale, rosy cheeked, bright eyed, and with her physical nature well developed, presenting a perfect contrast to the pale, delicate, sickly products of our American hot-house training, and protected from a vast deal of suffering to which her American sisters are subject.

This high, healthy physical development is not to be despised. It is as essential to happiness in this life, as proper mental or moral development, and neither can be neglected with impunity. The want of either, gives us an imperfect, incomplete character, wanting in some element of a well rounded, full formed human being; and yet while fathers and mothers are earnestly solicitous to surround their daughters with an atmosphere of influence, which will conduce to mental and moral development, but few there are who are at all concerned about the physical education of their children. Fatal folly!

With this folly, however, we have nothing to do just now, only in so far as it may serve to impress the lesson which it is our intention to inculcate, that the flower-garden on the farm, connected with the homestead, is highly important, regarded as an educational institution, or if the phrase please any better, as the means of securing to females of the family that occupation and exertion in the open air which their physical well being requires. Regarded from this stand-point, it seems to us that floraculture will commend itself to all thoughtful men, without taking into the estimate those peculiarly pleasing emotions, which contact with the beauteous forms, tints, and aromas of flowers, are so well calculated to produce.

The care of the flower garden, may, with peculiar propriety, be devolved upon the females of the family, and indeed, with most ladies, there is no need to issue a command to this effect. Generally they are not only willing, but anxious to have the supervision and superintendence of the flower-garden. Ladies generally love flowers, and one can scarcely be found, who does not esteem it a great pleasure and privilege to be permitted to cultivate them, and perhaps most of our male readers can bear witness that it requires some exertion of authority to restrain their wives and daughters from the indulgence of their taste for flowers.

Taking it then as established, that, provided you will allow your daughters to have a flower garden that they will superintend its cultivation, we have next to show that such superintendence will necessarily carry them much into the open air, and furnish them with healthful exercise. The proposition hardly requires elaboration. It is patent to the apprehension of every man who is in the least degree conversant with the culture of flowers, or indeed, with any culture of the soil whatsoever. Every farmer knows that to succeed with his crops, he must be diligent in his vocation, in the preparation of the soil, in scattering the seeds, in the cultivation of the plant when in the earlier stages of its development, and that all this requires a watchful eye, a discriminating judgement, and ceaseless and unremitting vigilance. All this is essential to the successful cultivation of flowers, and as the performance of these

duties carries the farmer over his fields, so would the young lady be necessitated to make frequent visits to her flower-garden. Indeed, her flowers would require much closer attention from the farmer's daughter than oats, and wheat, and tobacco require at the hands of her father, because while a general direction would enable the labourer to comply with his master's commands, in respect to the staple products of the farm, she would find that nothing could be properly done among her flowers without her immediate personal attendance and supervision. Thus, then, the young lady would be drawn often into the open air, and would find among her flowers those roses for the cheeks which are the crowning glory of youthful beauty. Besides which, it will be remembered, that many of the lighter labours of floraculture could be, and would be performed by the young lady in her own proper person. The labours which she would thus feel herself called on to perform are manifold. If she secured a choice rose, which she prized highly, she would fear to entrust it to the blunderings of a servant, but with her own fair hands would she commit it to the soil. So, also, in the propagation of roses and other plants, by layers, slips, and seeds, in the pruning of roses and flowering shrubs, in the training of honeysuckles and creepers, and so of a thousand and one things which would need to be done in the garden, and which her pride of success, and fear of failure would prompt her to perform. All these opportunities of useful, pleasant employment, concurring with their native, inherent love of the beautiful blossoms wherewith the Almighty Hand has adorned and beautified the earth, would inevitably conduce to the healthy development of the physical natures of our daughters, tend largely to brace and strengthen the nerves, and to give them that vigorous health which they so much need.

By such considerations, do we reach the conclusion, that a flower-garden attached to your homestead, would prove a great benefit and blessing to your daughters; and if in this we have not erred, then you are prepared to go further, and admit that the larger the space devoted to this culture and the greater the variety of plants introduced into the garden, the larger the measure of benefit which your daughters are likely to reap from it. Be not stingy and parsimonious in this matter, but let your liberality be such, that your daughters will have an honest and laudable pride in their flowers, else you will defeat the very object which you had in view, in the establishment of the flower-garden. Nor, on the other hand, must you treat with churlish indifference, or cold contempt, their petitions for assistance in the performance of the labours of the flower garden. There are labours to which their strength is inadequate, and for which they must draw upon your liberality. Meet these demands with cheerful alacrity, show by your ready response, that you approve of all that your daughters are doing in this behalf, and the temporary inconvenience to which you may be subjected will be more than compensated by the increased healthiness of the female members of your family; and your actual saving in doctors' fees, and apothecaries' bills, will more than repay the cost of the labour thus expended.

All this, it will be observed, is aside from those moral influences which floraculture undoubtedly exercises over its votaries, from that moral training which familiarity with the beautiful flowers (one has aptly termed them foot-prints of angels,) ensures to the heart and its affections. Upon this inviting field we cannot enter, but can barely touch it. Space permits us to do no more than suggest that all our associations, whether painful or pleasant, and whether with animate or inanimate creatures, impresses us for good or evil, tends to our moral elevation or degradation, and that all are agreed that rational association with objects of beauty, rightly used, tends always and ever to our advancement in goodness and purity. And among all the phases of the beautiful, there is none which exerts a more refining and elevating influence, than the beauty of nature as seen in forest and field, in the changing hues of the foliage, and the transient glories of bud and blossom. Many and beautiful are the lessons which the heart learns in quiet communion with the flowers, and the Bible, the writings of good men in all ages, the best productions of our poets, and the genial volumes of our most admired essayists, all bear testimony to this æsthetic value of flowers.

Add to all this, the air of refinement and elegance which a well stocked, well arranged,

well kept flower-garden gives to the humblest homestead, the delicious aroma which the sweet smelling Migniouette, the humble violet, the delicious heliotrope, the citron alice, the caliacanthus, and other fragrant plants and herbs cast upon the summer winds, and the ornament and beauty of buds and blossoms on the mantel, in the windows, and about the room, and we submit that our plea for flower-gardens admits of no denial or disputation. Squared to the strictest rule of utility, without appeal to the poetical instincts of our humanity, judged by the same rules of judgment which you bring to bear upon the introduction on your farm of a new product, a hitherto untried fertilizer, or a newly invented labour-saving machine, we claim that the flower-garden merits your approval, if not for your own advantage, certainly for that of the female members of your family. Will you have it?

Beauty an Element of Value.

There is a large class of men, especially among the agriculturists of the country, who affect to despise everything which is ornamental, and who account everthing worthless and foolish which is not, according to their modes of thinking, useful. These are *par excellence* the practical men of the community,—men who contemn the Lily of the Valley and the meek-eyed Daisy, and cherish the Sun-flower and castor bean, because the first serve merely for beauty, and the others give out oils and furnish an excellent food for poultry. It is this class of men who scoff at the advice to plant shade trees about the dwelling, to paint the house and keep it neat, to adorn the grounds with turf and evergreens and flowers, and who tell you with an earnestness of speech which attests their sincerity, that a manure pile in one corner of the yard is a far more attractive spectacle to a prudent, sensible farmer, than all the evergreens and flowering shrubs which have been planted from the days of Noah until now.

With all due respect for such persons, who are honest and well-meaning in the main, they are scarcely less blameworthy than that other class of simpletons, who despise the useful and affect only the ornamental.—who pass by the substantial in their hot pursuit of the showy. They have read to little purpose the book of nature spread out before their eyes day by day, who have not learned that beauty is an element of value, and that the true philosophy despises neither the ornamental nor the useful, but blends them together in happy union. Thus has the Creative Hand united this twain and that man is not wise, who would disunite them.

Even the strictest utilitarian among our readers will admit, that to a healthy eye, beauty is a more pleasant spectacle than deformity—thus, that a perfect, handsome, well-developed female, is a far more agreeable object than one ill-shapen, deformed, and hopelessly homely; and what is this but saying, that to a woman beauty is an attribute of value?

It will not be disputed, that a horse well formed, quick, sprightly, clean-limbed, and with bright, clear eyes, is worth more in the market than a heavy, awkward, slow, stupid animal; and here we find, that in a horse mere beauty is an element of value.

Two cows, of the same stock,—in every respect the same, except that one is handsomely formed, has a clean, glossy coat, and the other ungainly and dull; and every purchaser will prefer the handsomer animal of the twain,—and she will actually bring more money in the market. Again, then, we find beauty to be an element of value.

Two slaves are offered to the farmer, one a bright, active boy, with a pleasant countenance, intelligent eye, and neat, cleanly person; the other his counterpart in every respect, except that he looks untidy and uncleanly; has a dull, stupid countenance, and a sleepy, listless eye; and of the two you infallibly take the former, and will pay a larger sum of money for him. What is this but an admission that beauty is an element of value?

You go to purchase a vehicle in which to carry your wife and little ones to the country church, and two are shown you, which differ only in this, that one is handsomely painted, varnished and polished, and adorned with plain, neat trimmings,—while the other is rough, unpolished and unadorned. You choose the first infallibly; and thus again declare that mere beauty is an element of value.

Thus, then, in several very usual positions you act upon the assumption, that the doctrine for which I am contending is true, and these

illustrations might be extended forty times with equal facility. Let us, however, consider another and even more striking illustration.

You have one horse more than you need to have, and determine to sell one. Do you take him from the plough or wagon, low in flesh, rough-coated, and unseemly, and offer him for sale? Not so, you are not fool enough for that. He is put in the stable, fed, curried, rubbed, until the coat is bright and glossy, and his form rounded and full. Why all this care, labour, and expenditure of food. Only this, that you may improve the appearance of the animal in order that he may sell for more money. Are you not acting upon the presumption that beauty is an element of value? Undoubtedly you are, and you would pronounce that man a fool who should tell you that you were doing an unnecessary or useless thing.

If, then, in all these situations you find that beauty is an element of value, why shall you account it otherwise when you come to speak of your dwelling and your farm? Do you say that your family can dwell as comfortably in a house, the outside of which has not been painted? So could they ride to church as pleasantly in a vehicle innocent of paint, varnish, or polish. Say you that your farm will yield as much without shade trees and fruit trees, grassy lawns and beds of beauteous flowers. So could your horse draw as heavy loads without a glossy coat, or so much flesh upon his bones.

Nay, good friend, an unpainted house and an ill-kept, unadorned farm, are not so desirable as those which display the contrary attributes. They are not worth so much money in the market. Like the slave, the horse, the carriage, and the woman, the farm is the more desirable and attractive the more it is adorned with everything suitable and appropriate. You have never drained a low, wet spot; covered with vegetation a bare naked spot; planted an apple, peach, or pear tree,—arranged and improved a flower garden, lawn, or carriage-drive,—planted an evergreen, flowering shrub, or shade tree about your dwelling,—done anything which tended to please the eye of good taste, or to hide and conceal unsightly objects, but that you were doing that for your farm which the stabling, feeding, and dressing did for the horse which you intended to sell improved its appearance and so enhanced its value.

Are you still doubtful if this be true, learn its truth from what men say as they pass your gate, and that of your neighbour. Is it not always with words of praise that they refer to his place? Did you ever know an individual to pass his house that he did not say, "that is a handsome place, I would like to own it," or "that is a desirable place," or words to that effect? Nay, I put it to you, my practical friend, if you ever in your life passed by a farm house, which, neatly painted, stood in the midst of well-kept, handsomely ornamented grounds, without an emotion of pleasure as you looked upon it, and without a desire to be the owner of the place and the occupant of the dwelling? And will you not learn from all this, what it so distinctly and emphatically teaches, that the ornamental is useful, and beauty valuable? Will you now understand that you have all along been possessed of a false notion of utility, and that your practicality is a delusion, a cheat, and a humbug?—and that he is truly the practical man who neglects nothing which will improve the appearance of his farm and render it more attractive and desirable in the eyes of all men?

It is the recognition of this truth and its constant practice by agriculturists, in the Northern States of this Union, and by the farmers of England and France, which has caused the whole country to present the appearance of well-kept flower gardens, which challenge the admiration of all travellers. Take up what book of travels you will, and you read rapturous descriptions of the scenery presented by English farms, until your heart yearns for a view of a land presenting so much of beauty to attract and fasten your admiration. And can we doubt, that the great value of lands is in some sort attributable to the attention which is given to the ornamental? In view of the facts and reasonings already submitted, can any one question this? And if these be not enough, let us consider that here in our own State, it holds true universally, that in localities where a due degree of attention is bestowed upon the ornamental by the farmers, that land commands higher prices than in

other localities where the ornamental is altogether neglected.

From all which, we would have the reader gather, that money invested in shade trees, in fruit trees, in flowering shrubs, and flowers,—and in neatly arranged houses, and in paint for all the buildings on the farm, is not money wasted, but a judicious and profitable expenditure, which not only pays in the pleasant emotions such good taste excites, but also in dollars and cents, whenever the homestead shall be by the changes of the future forced upon the market to find a purchaser.

Shall it always Continue Thus?

Passing down town a few days since, we saw at the door of a confectioner some nice looking apples,—and it occurred to us that we would ask whence they came. "From New York," answered the dealer, giving just the reply which we expected that he would give. A few squares lower on Broad street, we addressed a similar question to a dealer, and received from him a similar answer. And then on Main street, at four different establishments, all of them extensive, a like response followed our inquiries.

The result occasioned us no surprise, nor will it surprise any reader of this paper, who remembers what we have heretofore written on this subject. More than once we have endeavoured to impress our farmers with the belief, that there is a large demand for apples every year in our Virginia cities, and that immense sums of money are sent North every year to the fruiteers of that region to supply this demand. We have long known and long deplored the fact, and our present purpose is merely to ask, if it shall go on thus forever? Will somebody tell us why this state of things should continue? Is there any good and sufficient reason why our dealers in fruit should be constrained to look to New York for their supplies of fruit? Can we not grow as good apples here as are or can be grown at the North? Is there not land enough to produce apples to supply this demand?

To ask these questions is to answer them. Every intelligent cultivator in the State is prepared to answer affirmatively to each of these several inquiries, and all that is lacking is the disposition to do what we are capable of doing. Give our farmers this willingness to act, and he answer to the caption of this article must be in the negative.

Cape Jassamine.

Louisa Co., Va., Oct. 21, 1857.

Mr. Eggeling.—I was so much pleased with your article on the cultivation of the Rose, in the September No. of the Planter, that I have determined to ask you for some information about *Cape Jassamine.* I have been trying for several years to raise some, but cannot get them to look thrifty. They look yellow, grow but very little during the summer, and none at all in the green-house. I have never been able to obtain more than half a dozen blossoms to a plant. Please inform me, through the Planter, what kind of soil is best suited to them, and if they require to be kept in the shade. Do they ever grow large in our green-houses? Mine are not over a foot in height, and are three years old.

Answer.—Of the Cape Jassamine, as it is sometimes called, its proper name being Gardinia Florida, there have been two kinds cultivated for many years. One is narrow-leaved and produces a great many flowers, of rather small size; the other has broad leaves and large blossoms, but fewer of them. In both, the flowers are white and remarkably odoriferous. There is yet another variety, called Dwarf Cape Jassamine, which never grows tall, but produces a quantity of flowers, which are smaller than the flowers borne by either of the first mentioned kinds. Within the last few years, Mr. Fortune, a celebrated English botanist, has introduced into England from China two new varieties of the Jassamine, which are called Fortuni and Japonica. We have seen but little of these, but those which we saw, the leaf was very much like our ordinary large-leaved Cape Jassamine, but the flowers much larger and in every way very superior.

There is no hard-wooded green-house shrub which is more easily propagated from cuttings, if the following directions be observed. Get river sand, or any other which has little clay in it, and then wash it in clear water until every particle of clay has been extracted from it, and nothing but the pure sand remains, which will be indicated by the clearness of the water after the sand has been washed in it. So long as the sand gives out earthy particles

to the water thus discolouring it, of course it holds some clayey particles, all of which it is the object of the washing to remove. Having thus cleaned the sand, take a small box, or pot, two or three inches deep, and fill it with the wet sand, pressing it down into the box until it is firm and solid. In this, plant the cutting, burying it an inch or two in the sand, and pressing the sand about the wood until it is tight and firm.

For cuttings, we always select small, short-jointed branches, the wood of which is hard and knotty, which root more readily than those which are greener and more sappy. The wood is perhaps two inches long, and before planting, we usually crop the leaves of about half their length. This is the whole process of making cuttings, and planting them; and after planting, place over them a glass,—a tumbler or pane of glass will answer,—set them in a very shady place, and keep them moist all the time.

The usual time for putting in cuttings, is about the first of August, and in from five to six weeks they will take root, and by pursuing this plan we rarely fail. After they have rooted, leave them in the sand for a month or two, until a mass of roots have been formed, and then they are to be planted in very small pots.

The proper kind of soil for the Cape Jassamine, is what is termed *peat*, usually found in low, swampy places, where vegetation is abundant. It is always of a very black hue, and ought to be well mixed with sharp sand,—and when it does not contain this, the sand should be added. Where this peculiar soil cannot be procured, a compost made of sand, leaf-mould, or woods earth, and powdered or pounded charcoal, in equal proportions, well mixed together, will answer the same purpose and produce the like desirable results.

Take, now, a very small pot, not more than two or three inches square, and place in the bottom a few chips of oyster shell, or small bits of crockery, to promote drainage; then fill with the peat or compost before described, and cover the roots of the plant, pressing the earth firmly about it. Keep it moist, leaving it in these small pots through the winter and until the following spring. Sometime in the spring, about May or June, the plant will probably begin to need more room, and should be transferred to a pot double the size of the former; and, as before, there must be something in the bottom to facilitate drainage. If the water accumulates about the roots, the plants will become yellow, become sickly, and finally die. The plant will need shifting thus annually, and about the period already mentioned,—but care must be observed not to give the plant too much space, as in that event too much water will be held in the earth, and the plant will sicken and die inevitably. An addition of one to two inches per year to the size of the box or tub, is, in general, amply sufficient,—and where more is given, oftener than otherwise the plant will be injured rather than benefitted.

During the summer, the Cape Jassamine ought to be kept in a spot where it can catch the dews of night, receive the beams of the morning sun, but where it will be shielded from the fierceness of the noonday. Under a tree is not a proper place, because there it will be kept from the dew; but a wall, or something of that kind, which will give shelter from the noontide heat, and yet leave it free to the earlier and gentle rays of the morning and to the visits of the balmy dews, is a suitable situation.

In the winter, the Cape Jassamine requires to be kept in a green-house, basement room, cold frame, or anywhere that it can be protected from freezing, and should be removed to such place not until the severe cold weather sets in.

Our correspondent will observe that the foregoing remarks are fully responsive to most of the inquiries contained in her letter; and in reply to others, we have to say, that plants three years old ought to be two feet high, and that we know plants in Richmond which are fully twelve feet high, producing hundreds of flowers during a summer; and have at present in our grounds a plant which is not less than seven feet high, and which had this summer more than a hundred blooms. We gathered from it as many as eighteen flowers in one day.

We cannot, of course, tell our correspondent what is the difficulty with her plants, but most probably it is owing to one of three causes—want of a proper soil, insufficient drainage, or maybe they are in pots or tubs which are too large for

them. This latter fault sometimes leads to rapid growth of wood without the production of many blossoms,—but oftener in slight growth and few or no flowers; but there is nothing affects these plants so injuriously as insufficient drainage. They require a great deal of water, but it must pass rapidly off, for, should it stand about the roots, damage and injury to the plants is inevitable. With a proper soil, proper drainage, and proper care, our correspondent may have large plants and multi udes of flowers.

Persons desiring to propagate only a few plants, may accomplish it by making layers, as we have described the process in our article on rose culture, in a previous number of the Planter.

For the Southern Planter.

In the "Horticultural Departmennt" of the December No. of the "Planter" are two articles, one entitled "Apples," and the other "Root Pruning," which seem to me not altogether consistent with each other in their reasoning and recommendations. The object of the first named of the articles alluded to, is to enforce the necessity and illustrate the advantages of manuring apple trees.

In this piece the position is maintained that an annual dressing of manure will secure a crop of apples every season. That the general barrenness of orchards each alternate year, is owing to no natural law, but to the fact that the "energies of the trees have been exhausted by the production of a crop of fruit, and that they can be recuperated in time for a crop the next year by a good manuring." And therefore every reader of the *Planter* is confidently assured that all he has to do to ensure the pleasure of gathering a fine crop of apples every fall, is to invigorate the energy and increase the luxuriance of his trees by a heavy dressing of manure during the winter.

Now, Mr. Editor, as I subscribe to the *Planter* for the purpose of deriving from its pages useful information and instruction, I always endeavor to bring to its perusal a docile and teachable spirit. Hence I was much pleased with this simple, easy and effectual method of securing a crop of fruit every year. All that was necessary being to enrich the soil and thereby secure to the trees the necessary vigor.

In this happy frame of mind I encountered the article on "Root Pruning," in which to my great surprise, I read that trees of great vigor and unsubdued energies would often produce no fruit until by the application of a "sharp chisel" to the "top or other leading root, the amount of nourishment drawn from the soil by the tree was diminished, thereby stunting its growth and so producing fruitfulness." And in farther illustration of the principle that a diminution of vigor is favorable to the production of fruit, it is stated that the frequent removal of young trees hastens the time of their bearing fruit, because by so doing, the growth of the tree is "impeded." In expressing the opinion that if one of these articles is sound in its reasoning and correct in its recommendations, the other cannot be so, I may be only exhibiting my ignorance of the sciences of *Arboriculture* and *Pomology*. Nevertheless, it seems to me that if manuring adds to the fruitfulness of trees by increasing the amount of nourishment they derive from the soil, "Root Pruning" cannot accomplish the same end by diminishing that supply. If "Root Pruning" increases the fruitfulness of trees by diminishing their vigor and luxuriance, it seems to me it would be the part of wisdom to plant orchards upon *poor land*, and thus secure the requisite degree of "stunting" without having to resort to the laborious and tedious operation of "chiselling" off the roots.

A good dressing of manure every winter, would, (upon the reasoning of the article on "Root Pruning,") I should fear in a few years prove as disastrous to the production of fruit, as the site of a "deep well that had been filled up." It is, however, consoling to reflect if any reader of the *Planter* should, by following the recommendation of the first article alluded to, induce such a vigorous growth of his trees as to forbid the production of fruit, he can remedy the injury by an application of the "sharp chisel" to the "top or other leading root" as prescribed in the second. TYRO.

December 7th, 1857.

From the Ohio Farmer.

THE LAWN.

On the Development and Cultivation of an Elevated and Correct Taste among the Farming Community, through the medium of their Amusements.

The Great West, with its prairies, groves, lakes, flora and soil, is a most perfect garden of itself, on a scale so unlimited and in a style so inimitable that all attempts of man at changing or improving look like puerile efforts at marring the beauties furnished him at the hand of his Creator. As it could not be preserved as a whole, but is subdivided and allotted to individuals, it is appropriate that each one should endeavor to adorn and improve in the best manner his portion. Every farmer in locating his houses, buildings and fields, should appropriate a suitable extent of ground for the purpose of a lawn. At their periods of leisure, he and his family should study the best means and modes of stocking and cultivating it. This subject

was so ably treated upon in the November number of the Horticulturist that I would solicit its perusal by every farmer, not only in the State, but in the Union. I trust that its editor, Mr. Barry, will pardon the freedom with which I extract from it. He observes: "We wish to see farmers' homes—the farmers' life made more attractive. Hitherto, as a general thing, the improvements which have been made are of the useful kind; having reference mainly to the supply of man's physical wants. Most of our farms must be regarded as mere manufactories of food and clothing; very little has been done to gratify the intellect, taste or feelings—the higher and nobler attributes of our nature.—And this is one reason beyond a doubt, that many young persons who have, by means of education, reading and society acquired a certain degree of refinement, became dissatisfied with agricultural life and have sought the city. Intelligent, educated men cannot surely remain satisfied with being growers of grain and breeders of stock—they must love their home; and to merit their love and attachment, that home must possess something of beauty, for the love of the beautiful is an instinct of man's nature. A large portion of the population is constantly on the move; the old home has no hold on their affections—or at least not enough to overcome the novelty of a new one. We see the population diminishing in the very heart of the finest agricultural districts in America, where nothing is so much needed as human beings. It is at certain seasons impossible to procure laborers enough to do the work. This state of things is unfavorable to the development of the country's resources, and equally unfavorable to the attainment of a higher, a happier social condition. It is not unreasonable, we trust, to expect and even to urge some reform on this point. Make home attractive—cultivate the taste and feelings and affections as well as you do your fields. Why should a wealthy farmer, with his 50, 100 or 200 or 300 acres of land, content himself with a rod or two of door yard and a dozen or two of shade trees, shaped and managed after the precise fashion of a village plot? Why can he not just as well have a park and pleasure ground of several acres around his house, broad glades of lawn and groups of trees, separated from the cultivated portion of the farm by green hedges? This, with a well stocked orchard and good ample kitchen garden, would come up to our ideas of a country home; and it would be impossible for children to grow up in such a home, without becoming attached to it, and having their taste expanded, their feelings refined, or without appreciating the comforts and blessings of a country home. But some careful farmer will ask us, 'How can we afford to lay out parks and pleasure grounds and keep them in fine condition? It would cost us more than the whole labor of our farms. Only think what an expenditure of money and labor this hedging, and planting, and mowing this pleasure ground would involve. It would be all very well if we could afford it; but we cannot, and we must leave it to retired gentlemen who have made their fortunes in town and come out into the country to spend them.' But we reply, 'You can carry out our plan without incurring a heavy expense.' Fence off with Osage Orange or Buckthorn, at a cost of about twenty to twenty-five cents a rod, five or ten acres of land immediately around your doorway. Seed it down, and it will produce good crops of hay. You can get plenty of young maples, elms, tulip-trees, bass-wood, ash, and other native trees in the woods, which can be taken up and planted at leisure intervals in the fall, when the farm labor is over, and early in the spring, before it commences, and even in winter, in mild weather. Until the trees are established, it will be necessary to cultivate the soil around them. It will not be necessary to cover the whole ground with trees, but merely to scatter them here and there in groups, and singly to give it a park-like character, which will distinguish it at once from the cultivated fields. A little can be done now, and a little again, as leisure affords, and in a few years the work will show. Meantime, the land is cropped profitably, for hay is always a paying crop, and an indispensable one. The ground nearer the house, may be planted with some rarer trees—a portion of them evergreens. A small portion of the ground near the house, might be separated from the main body of the park, by a wire fence, or movable hurdle fence, and kept mowed; and if embellished with a few flowering shrubs, and a few beds of flowers, all the better; but these, for economy's sake, can very well be dispensed with. When the planting is finished, and the trees fairly established the park might be pastured with sheep, as many parks are in Europe, and thus it would always have a closely cut surface, without the expense of mowing, and the sheep would be an interesting feature in the scenery."

With the foregoing views of the editor of the Horticulturist, we entirely coincide, except in the requisites for rendering the farmer's home what it should be. The lawn is essential, but there are other appurtenances required to give it a finish—to which we shall subsequently allude.

In our proposed domestic agricultural schools, books on the subject of the lawn, should be at command. Much valuable information on this subject, is contained in London's Suburban Gardener, and Downing's Landscape Gardening. Smith's recent edition of Michaux and Nuttal, embraces a description and figure of most of our forest trees. These works are, however, costly, and beyond the means of many farmers. As a substitute, the cheap, well arranged, and very valuable work of Thomas Meehan, entitled "the American Hand Book of Ornamental Trees," should be found in the library of every farmer.